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LOOKING AHEAD
... with the Editor

PREVIOUS to this time drilling operations in Egypt have been largely confined to the area immediately bordering the Red Sea and the Gulf of Suez. Four fields have been developed at the head of the Red Sea in a comparatively restricted area, but none have been of major rank.

The strikes have been in the area within the Red Sea graben block. Lack of success in finding additional producing localities along the graben trend is believed to be due mostly to the fact that nothing short of actual drilling will provide reliable information on subsurface conditions in most of the area.

Structural mapping by both geological and geophysical means is virtually stymied because of the very thick mantle of so-called Miocene sediments that cover the folded and faulted bedrock section containing the Cretaceous and Carboniferous Nubian sandstone series in which most of the oil occurs. The difficulties attending interpretation of geophysical data must be surmounted before further success can be expected in the search for oilfields within the graben area.

Three drilling rigs on wildcat locations in northern Egypt at this time are seen as forerunners of numerous attempts that will be made in the immediate future to open new fields in this country.

Don L. Carroll, foreign editor of THE OIL WEEKLY, will review operations and conditions in Egypt in an early issue. A map of the area will be included.

THE OIL WEEKLY

ENGINEERING • NEWS • STATISTICS

Published by THE GULF PUBLISHING COMPANY, Houston, Texas

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Published Every Monday. Single Copies 15 cents (Except Special Issues). Subscription price: domestic and foreign, $2.00 a year; 2 years, $3.00; 3 years, $4.00. Advertising rates on application.

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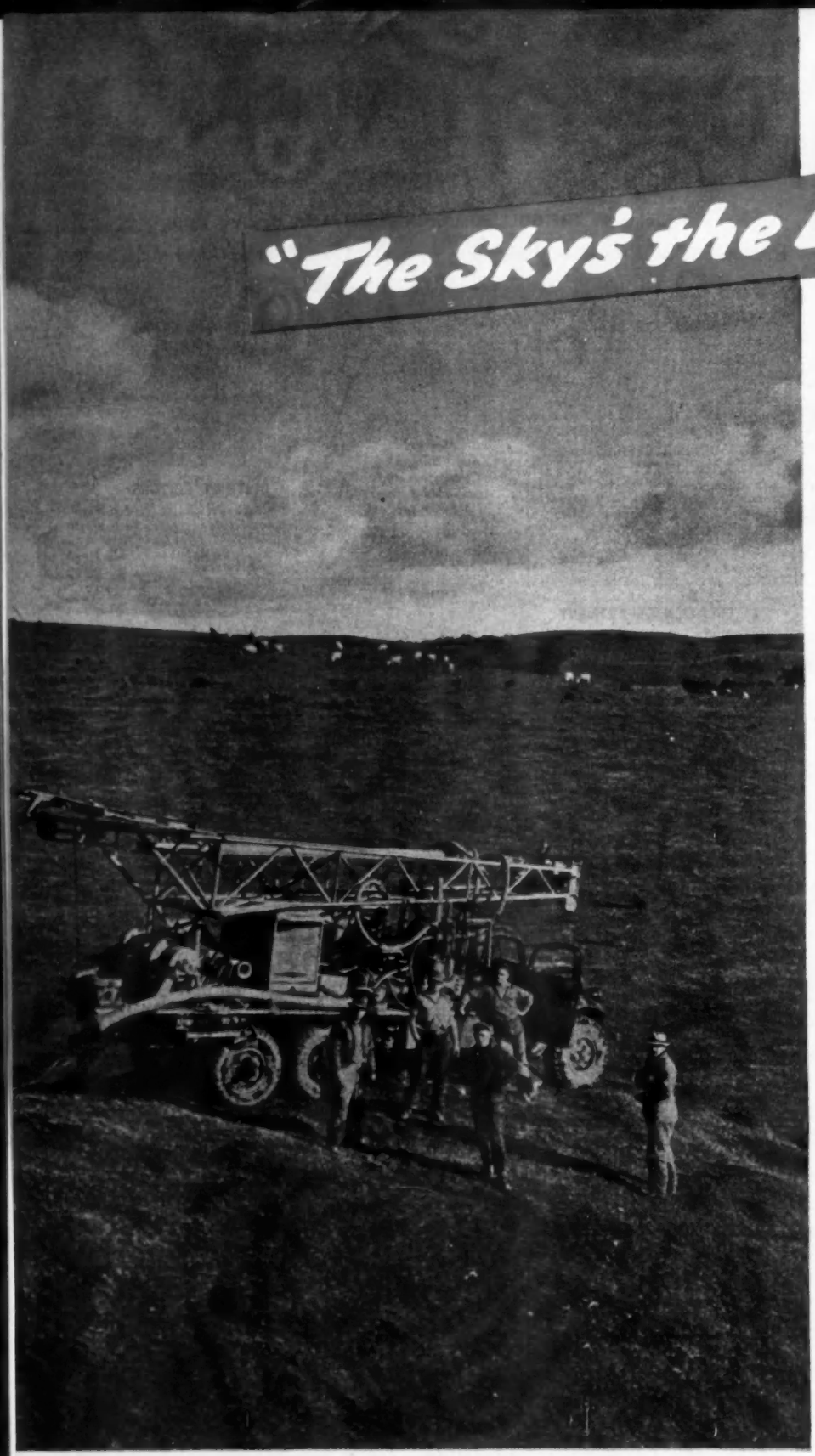

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The Lookout

If any new gas conservation measure is passed by the Texas Legislature, and it became quite doubtful last week, amendments will make it entirely different from the bill now pending (See page 43).

* * * *

Unless ratable purchase of natural gas production becomes a reality in Texas soon, either because of commission orders under the new court decision or due to legislative action, competition in gas transmission may be increased. Some producing companies with large gas holdings may be forced to go into the gas business in order to find a market outlet.

* * * *

FPC's investigation of the gas business has not been killed, although it failed to get the larger appropriation sought from Congress and has postponed hearing scheduled for May 1. FPC men are reported checking gas waste in various parts of Texas, and their data will be ready for any hearings.

* * * *

PAW officials are expected to make strong representation to the House Ways and Means Committee when it considers the bills regularizing the option on intangible drilling costs. "Unless the situation is dealt with promptly and adequately 1945's drilling program will be jeopardized."

* * * *

Deputy Administrator Davies' promised 50 percent increase in civilian gasoline rations within 30 days after victory over Germany, may, if it ever materializes, prove shortlived because of: 1. Intensification of Japanese war; 2. Need for strict car and tire conservation; 3. Need for petroleum supplies in liberated countries where disrupted transportation means extended use of trucks and planes.

* * * *

Organized labor, concerned over the employment outlook following V-E day, will cause German prisoners of war to be yanked out of U. S. industrial plants and sent back to their camps.

* * * *

Strong lobby pressure will appear in Washington seeking removal of income tax exemptions provided farm and other cooperatives. Tax revision after V-E day also may lop off tax-free privileges of government-owned corporations.

* * * *

With Allied European armies closing in for the kill, current acute manpower situation should be shortlived. Present draft of 120,000 men monthly may drop one half when Germany is defeated. New 17 and 18 year olds would about meet this quota. If, as some say, war contract cancellations and army discharges result in release of 2 to 2½ million men and women within six months after Germany's defeat, it would mean many industries, including oil, would be getting more men than they lose.

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The Changing Panorama

Mississippi Moves Toward Conservation

BETTER regulation of oil, gas and condensate field development and production in Mississippi is promised by Governor Bailey's call for a public hearing in Jackson on May 1. This is a move in the right direction. It should prove beneficial to the state and the oil industry, as it may result in the conservation of a natural resource.

Purpose of the hearing is to obtain evidence on physical waste that may be taking place or is imminent, to receive proposed conservation and spacing laws, and to take steps that will enable the state's board to conserve oil, gas or condensate.

This offers operators, landowners and other parties a chance to assist state officials in drafting the kind of conservation law that will be most helpful to all concerned. They can do much to help themselves and also help the state if they will whole-heartedly support Governor Bailey's public hearing. Soundly-based suggestions should be their contribution.

Non-Diversion Tax

NATIONWIDE recognition of the folly which attends the diversion to non-highway purposes of state funds obtained from taxes on motor fuel and car registration fee sources was recently emphasized by B. H. Harkham, director of the American Petroleum Industries Committee, American Petroleum Institute. He pointed out that legislative action thus far in 1945 by several states will add to the number that are prudently preparing for the highway future by safeguarding the funds designated for road construction.

This nationwide trend toward safeguarding highway funds by the passage of anti-diversion amendments is gaining ever-increasing momentum. States having adopted such constitutional amendments now include: California, Colorado, Idaho, Iowa, Kansas, Maine, Michigan, Minnesota, Missouri, Nevada, New Hampshire North Dakota, Oregon, South Dakota, Washington, and West Virginia.

Newly developed industrial uses for helium gas, chiefly in the welding of magnesium metal and its alloy as now widely employed in the aircraft industry, has increased the sale of this non-inflammable gas to commercial distributors to 250,000 cubic feet monthly in contrast with 88,000 in 1942.

United Front Needed In Tidelands Fight

CALIFORNIA has taken aggressive issue with Secretary of the Interior Harold Ickes' claim to oil in the tidelands. The first step in opposition is the manifesto of 1945, recently passed by both branches of the California legislature, which proclaims in unequivocal language that California as a sovereign commonwealth always has, does now, and forever shall own its tidelands, submerged lands, the beds of its lakes and navigable streams, and the fauna and flora and minerals therein and thereunder.

Ickes' demands, it is claimed by Oil Producers Agency, stagger the imagination in their enormity. In sum and substance, the claim as made by the Secretary of the Interior would transfer title to all the wealth of the oceans and shorelines, lakes and rivers and estuaries and deprive the state treasury of much of the oil and gas royalties.

Every state in the Union with tidelands is involved. The opportunity presents itself for all states to enter upon a concert of action in defense of their respective and collective sovereignties. "Failing to do this," it is warned, "we may be defeated one by one. Mr. Ickes' policy is 'divide and conquer'."

Oil Helps Nation Reach Farm Goal

THE War Food Administration has set the 1945 crop goal at 364,000,000 acres which is an increase over 1944 of 4,000,000 acres. Oil will play an important part in enabling farmers to reach the goal if they do, for since the beginning of the war agriculture has had to turn more and more to power equipment for its operations.

Loss of manpower has not proved as great a handicap on the farms as in other industries. For instance in the year ending with June, 1944, there was a decrease of 8 percent in farm employment, yet there was a gain of 25 percent in farm production. This was possible says E. O. Bretz, in the January-February issue of *The Orange Disc*, Gulf Oil Corporation publication because of the American farmer himself. "Used to hard work and long hours, he gave unstintingly of his time and kept on schedule by lengthening his day and increasing his work week." He was greatly assisted by "technological improvements which have been made in scientific argiculture and the cooperation between industry and government which allowed these improvements to take quick effect.

Much of the technological improvement consists of power machinery most of which is powered by fuel from petroleum. Gulf Oil Corporation has become active in trying to aid farmers. Through publication of its *Gulf Farm Tractor Guide*, information on the selection of proper lubricants and the care and maintenance of farm machinery has been widely distributed. Now a motion picture, "Tomorrow's Harvests," is being shown in farm communities in conjunction with farm meetings to provide information and assistance as well as helpful service to farmers.

Holding the Line

"DO YOU remember," asks Ashley Dewitt, connected with the Severns Drilling Company, in Los Angeles, "when Prentis Brown, OPA Administrator said, 'The OPA will not allow an increase of 35 cents per barrel in the price of crude oil, because it would have the effect of causing an increase of ¾ cent per gallon in the price the public would have to pay for gasoline.'?

"Well, just read this one," he goes on, and sends the following photostatic note from the Los Angeles Examiner, Saturday, January 6, 1945:

"Los Angeles yesterday purchased 875,000 gallons of gasoline for use in city motorized equipment for the next six months at 1 cent above the 1944 price in all grades."

Dewitt comments: "It would seem that the California crude oil producer is about the only man holding the line, which is about the greatest line of *pure bull* ever dished out as yet."

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The Week's News

DEMAND for legislation to write definitely into law the option on intangible drilling expenses has not been quieted by the Internal Revenue Bureau's announcement that it will not immediately apply the F. H. E. decision. Bureau's announcement is not binding should the government get a final decision. At St. Louis Judge J. C. Hunter and Russell B. Brown were told to pursue the matter of remedial legislation vigorously. See story below.

Senate Oil Investigation—All industry organizations, corporations and government agencies are invited to participate in a program of investigation covering every current major oil problem which will be undertaken by the special Senate committee headed by Chairman Joseph O'Mahoney. (Page 46.)

Butane Directive Extended—Directive 79, forbidding the use of butane and propanes, butane mixtures in drilling operations, has been extended indefinitely by PAW because of continued scarcity of supplies.

Increased Gasoline Seen—Defeat of Germany will bring a 50 percent increase in civilian gasoline rations, according to Administrator Ickes, but final decision lies with OPA. See page 42.

Court Decision for Tidelands—Declaring no Secretary of the Interior should be required to pass on the government's title to tidelands, Ickes revealed his determination to force the courts to pass on the issue. Two hundred applications are pending and he hopes for quick action. He "assumed" Congress has the right to relinquish government claims, as proposed in several pending bills.

State Department Delays Pact—Action by President Roosevelt might be necessary to persuade objecting State Department officials to abandon their resistance to the anti-trust provision of the Anglo-American oil pact, Secretary Ickes declared. The draft has been held up by the State Department for weeks.

Flood Worries PAW—Flood conditions on the lower Mississippi carry a potential threat to East Coast oil supplies with barge movement at a virtual standstill and East Texas conditions threatening Big Inch supplies. Tank car deliveries to District 1 hit a six-months high for the week ended March 31.

USSR As Oil Exporter—The Department of Commerce foresees Russia as re-entering the petroleum export field. (Story on page 45.)

Oil Makes War Fog—Importance of oil in modern warfare for other than motive power was evidenced by disclosure that while, in bombs, it was making possible the firing of Japanese cities, it also was being transmuted into long-maintained smoke screens. Such a screen hid movements of our troops along a 66-mile Rhine front for weeks.

FPC Powers Limited—The Supreme Court has upheld FPC's authority to fix gas rates, it denies that agency the power to control drilling and spacing of wells and may put other limits on the commission. (See page 44.)

PAW Warns About Draft—A warning that unless 60 to 65 percent of an estimated 28,000 oil workers in the 18-29 age group are given continued deferments oil production will fall off 250,000 barrels daily, reportedly has been sent by PAW to the McNutt Committee. PAW takes the position that the committee and not their agency must accept responsibility for any effects of the new draft policy, and demand that the committee tell the reasons for any decision reached.

Reconversion Plans—Fuel conservation practices could end with V-E day but gasoline rationing must continue, War Mobilization Director Byrnes said as he resigned. Suggestions for industry reconversion pattern on page 42.

Oil for Liberated Areas—A PAW-sponsored inter-agency committee will tackle problems arising from military and civilian needs for oil in liberated areas in Europe. See page 42.

Gas Waste Committee—The next meeting of the Texas Railroad Commission's executive committee of industry representatives studying gas waste will be held in Austin on April 13. A permanent chairman will be selected to succeed George Sawtelle, of Houston, resigned.

Texas Gas Measures Snarled—A decision by the Texas Supreme Court threw a bombshell into legislative hearings on gas conservation proposals and much support faded from what had been publicized as "agreed" measures. The Senate and House committees will take final action this week. See page 43.

INGA Enters Hearing—The Independent Natural Gas Association will take part in the gas investigation of the FPC and has authorized employment of legal and engineering staffs for presentation of the industry's case.

Want Auto Program Speeded—American Automobile Association warns that unless Washington takes prompt steps, 3 to 4 million passenger cars will go off the road before midsummer, urges WPB to speed up plans so car manufacture can start soon after V-E day. Upped programs in tires and batteries also urged, as was definite notice regarding additional civilian gasoline available after V-E day.

Last Half Steel Allocations—Gloomy is the outlook for tubular goods during the last half of 1945, the military demand for bombs and rockets being its chief competitor for steel. Coal strikes have not helped. See page 43.

Oil for Argentina—The first tanker of oil from the United States to Argentina is reportedly on the high seas. Due to the United Nations ban, lifted when Argentina declared war upon the Axis, it will be the first United States shipment there in months. Linseed oil, badly needed in this country, is to be sent in exchange.

Drilling Cost Option Legislation to Be Pushed

Announcement by the Internal Revenue Bureau that it will not immediately apply the principles laid down by the Fifth Circuit Court of Appeals in the F. H. E. case will not serve to halt the drive for congressional action to write the intangible drilling expense option definitely into the statutes, it was made clear in Washington this week.

Industry representatives in the capital and members of the House who have interested themselves in the matter were for the most part agreed that the bureau's announcement meant only that it would not apply the F. H. E. decision until the issue was settled finally by a Supreme Court review of the case. Should the Supreme Court outlaw the option, the bureau would be forced to follow its decision. On the other hand, should the present case fail, industry spokesmen said, it is quite likely the Treasury might attack the option in other proceedings.

The General Depletion Committee, meeting in St. Louis, held a similar view and voted that their co-chairmen use their fullest discretion in handling the matter of satisfactory legislation.

The bureau's announcement was a quite natural procedure under the circumstances, since if it applied to F. H. E.

decision and the government eventually lost the case it would necessitate a re-examination of any returns settled in the interim. At the same time, it did give some assurance to operators that there would be no sudden reversal of the bureau's position.

Throughout the industry and in some congressional circles it is believed that the only way to settle the controversy is by legislation writing the option into the internal revenue code, the objective of the several bills now pending before the House Ways and Means Committee.

Quick Action Sought

A request that PAW, the Treasury Department and the Internal Revenue Bureau be asked to submit their views on such legislation was submitted to Chairman Doughton of the House Ways and Means Committee last week by Representative Daniel A. Reed of New York as a preliminary step toward securing prompt consideration of his bill.

Quick action on the legislation is essential if the PAW drilling program is not to be seriously threatened, Reed told THE OIL WEEKLY, adding that operations already have slumped nearly 50 percent.

Quick action on the legislation also was asked by Russell B. Brown, general counsel of the Independent Petroleum Association.

"The real remedy is for Congress to make clear its intention to preserve in substance the regulation originally made to meet a condition that required specific treatment," Brown said. "The history of the industry, operating for more than 25 years under the tax principle embodied in the regulation which was held invalid, justifies congressional support to the effort to have this question cleared up for all time.

"The issue is broader than the oil industry. Many will hesitate to go ahead with their full development and drilling programs until the cloud of uncertainty has been removed. This will have a public effect."

Representative Jennings Randolph of West Virginia also announced that he would enter the fight on the side of the oil industry, introducing legislation to permit the deduction from income of the cost of drilling non-productive wells.

Randolph disclosed that he had asked Administrator Ickes if he would favor such legislation in view of the court decision.

St. Louis Action

Congressional action was unanimously recommended by the General Depletion Committee of the oil industry in an emergency meeting held in St. Louis April 4. At the same time Judge J. C. Hunter and Russell B. Brown, co-chairman of the committee, were instructed to use their fullest discretion in exploring and handling the matter of satisfactory legislation.

The well-attended meeting was also unanimous in the opinion that the industry could not possibly meet the requirements of the government in the matter of new wells and continued high production if it continued under the threat imposed by the recent Circuit Court decision.

This feeling was expressed despite the very friendly tone of a letter from Joseph D. Nunan, Jr., commissioner of Internal Revenue stating the bureau's present intentions.

It was pointed out that the commissioner evidently was expecting congressional action to clarify the situation, and that the deterring effect of the court decision, already apparent in drilling reports throughout the country, likely would remain until Congress acted.

Legislation discussed at St. Louis related only to action which would continue to give the oil industry the same protection it has had for more than a score of years.

The letter from Commissioner Nunan could be interpreted as an indication that the court decision may have been far more sweeping than the Treasury Department had anticipated, or even desired and the pledge that the tax commissioner would "in no event" apply retroactive measures was most reassuring.

Full discretion was given the committee as to the wording and time of such legislation as may be sought.

Reconversion Affecting Oil Outlined by Byrnes

Reconversion of the oil industry will begin in a small way immediately upon the defeat of Germany, it was indicated last week by War Mobilization Director James F. Byrnes as he prepared to resign, apparently convinced that V-E day is definitely in sight.

In a report to the President and Congress outlining the administration's course between the defeat of Germany and the victory over Japan, Byrnes declared that V-E day should be marked by the revocation of the brownout of outside lighting, the midnight curfew for places of entertainment and the limitations on heating temperatures, all three of which involved conservation of oil as well as other fuels.

Gasoline rationing, however, must be continued, Byrnes said, and while the War Production Board will discontinue the controlled materials plan as soon as conditions permit, probably substituting a simple priorities system, and will revoke its other limitation and control orders, it will be necessary to maintain regulation of certain materials which will still be in short supply, although limitations on the consumption of most metals will be necessary only for a relatively few months.

Byrnes warned that there would be some unemployment after the defeat of Germany, but deemed it unlikely that more than 1,000,000 workers will actually be out of jobs in the following six months. These will quickly be absorbed in the reviving civilian industries.

After the defeat of Japan, he said, the government must be prepared to give full assistance to existing industries by easing the excess profits taxes.

Inter-Agency Group Will Handle Oil for Overseas

Organization of a new inter-agency committee which will allocate oil for overseas use has been undertaken at the suggestion of PAW to deal with the knotty problems that will arise with the liberation of Europe.

Deputy Administrator Davies will head the committee, which will include representatives of the Army, Navy, State Department and Foreign Economic Administration. Both military and civilian oil needs will be handled. Whether the committee will cover all foreign oil allocations or confine its activities to Europe was not announced.

At the outset oil must be supplied to the liberated countries to keep their economies moving until their own oil industries can be restarted, then to supply their refineries until it becomes possible for them to arrange for their own sources of supply, which probably will not be until the defeat of Japan permits the lifting of restrictions on the movement and consumption of oil.

Probe Threatened If OPA Does Not Consider Figures

Congressional investigation of OPA's refusal to consider the replacement cost of finding and developing oil as a factor in the determination of production costs was threatened last week by the House Small Business Committee.

Chairman Wright Patman of Texas pointed out that although the cost study which his committee recommended is now being made, the OPA is refusing to meet the request of the industry advisory committee to consider finding and developing costs.

"The survey will collect data in this respect," he explained, "but OPA has served advance notice that it will disregard this data in its conclusions which might lead to a price increase."

The chairman said the correspondence is now under way and that OPA has been advised that "unless more convincing reasons can be submitted in support of OPA's position on this question, the committee proposes holding additional public hearings."

Ickes Sees More Gasoline Available After V-E Day

Defeat of Germany may make possible a boost of 50 percent in civilian gasoline rations, Administrator Ickes said April 5, but final decision will lie with the OPA, which has authority over rationing.

Current estimates, Ickes said, indicate that between 100,000 and 200,000 barrels of gasoline daily will be released through the termination of fighting in Europe. Double that quantity would be required if rationing were lifted entirely. However, the administrator warned, there are "a lot of catches" to any predictions made now.

Steel Outlook Continues Gloomy

PAW, WPB and Army and Navy officials are gravely concerned over the steel outlook for the last half of the year and particularly the prospects for tubular goods, for which the industry's drilling program and the military rocket, shell and bomb program are competing.

On the basis of present conditions, it is more than possible that the drilling program for the third quarter may have to be cut back further than was the case this quarter, although efforts will be made to minimize the reduction of domestic operations by first reducing the foreign operations program.

Government representatives recently made a tour of the tubular goods mills and were told definitely that without reduction of military orders already on the books, the mills will be unable to meet industry requirements at any time during 1945.

An inventory of all available stocks of tubular goods is being made with a view to ascertaining how much material the industry itself holds that can be put to work.

Meanwhile, a new factor of serious proportions is the wildcat strikes in the coal mines. Already steel mill furnaces are beginning to close down, 35 U. S. Steel Company blast furnaces in Pittsburgh being down at the end of the first week of the strikes.

This interruption of steel production, unless quickly terminated, will disrupt all steel programs, and leave the WPB to face difficult decisions with respect to allocation of supplies.

Some officials say that if the oil industry continues to lose its labor a lack of tubular goods might be of little moment.

The WPB is watching the situation and within a few weeks officials will meet with representatives of the various agencies to discuss third-quarter allocations. The major question is how far the military will cut back their shell, rocket and bomb programs in order to boost oil operations.

Court Decision Snarls Consideration Of Texas Gas Conservation Measures

Natural gas conservation by state regulation was very much in the limelight in Texas last week, as two developments of outstanding significance took place in Austin.

The first was a far-reaching decision by the Texas Supreme Court, which held that present statutes give the Texas Railroad Commission the power not only to regulate and prorate daily gas production for the purpose of preventing physical waste, but also for the purpose of protecting public and private interests, it has the authority to adjust correlative rights. Production of natural gas and the question of correlative rights are not dependent on each other, and each has its own independent standing under the state law, the court held. The decision, which reverses rulings of both the trial and Civil Appeals courts in the case styled F. M. Corzelius et al vs. H. M. Harrell, declared the commission has broad discretion in the exercise of these powers.

The second development was hearings on new proposed gas conservation measures before committees of both the House and Senate. At these hearings considerable opposition developed to the bills, although they had been drafted by a committee from the oil and gas industries. As a result the chances of new gas conservation statutes being enacted become uncertain. All action was postponed until this week, when the Senate committee will vote at a closed session on whether to pass its bill to the floor, and when the House committee will hold additional hearings and also consider an entirely new bill it instructed a sub-committee to draft.

Meanwhile, Railroad Commissioner Olin Culberson called a meeting for April 10 of a committee named by Governor Stevenson to formulate plans for appearances of Texans at the Federal Power Commission's hearings on natural gas.

Court Decision's Effects

The court decision did much to clarify the commission's range of authority to regulate gas production, a question much in doubt because of lower court rulings in the Corzelius-Harrel case. Many think the decision means the commission has unlimited authority to do anything necessary either for the prevention of waste or for the protection of correlative oil and gas rights.

Much opposition at the legislative hearings was on the basis that provisions of the proposed measures would materially curb rather than strengthen the commission's authority to prevent natural gas waste, especially in view of the court decision, and therefore would increase rather than reduce gas waste. Additional opposition was based on the opinion the bills would violate the anti-trust laws and also permit the commission to decide on economic waste in violation of the state constitution. Proponents declared the court decision did little to broaden the commission's authority and urged passage of laws to accomplish this.

The suit involved commission orders which limited production of gas for light and fuel from a Corzelius well in the Bammel field to 20 million cubic feet daily. Corzelius contended the Railroad Commission had authority to require proration to adjust correlative rights only as an incident to waste prevention, and that there was no waste in this instance so the commission did not have the right to limit his production. He specifically was attacking Sections 10 and 11 of Article 6008, Revised Civil Statutes of Texas, as follows:

Statute Cited

"Sec. 10. It shall be the duty of the commission to prorate and regulate the daily gas well production from each common reservoir in the manner and method herein set forth. The commission shall prorate and regulate such production for the protection of public and private interests:

"a. In the prevention of waste as 'waste' is refined herein;

"b. In the adjustment of correlative rights and opportunities of each owner of gas in a common reservoir to produce and use or sell such gas as permitted in this article." . . .

"Sec. 11. The commission shall exercise the authority to accomplish the purpose designated under item (a) of Section 10 when the presence or imminence of waste is supported by a finding based upon the evidence introduced at a hearing to be held as herein provided.

"The commission shall exercise the authority to accomplish the purpose designated under item (b) of Section 10 when evidence introduced at a hearing to be held as herein provided will support a finding made by the commission that the aggregate lawful volume of the open flow or daily potential capacity to produce of all gas wells located in a common reservoir, is in excess of the daily reasonable market demand for gas from gas wells that many be produced from such common reservoir, to be utilized as permitted in this article."

Concerning the question; the court said in part:

"The law states in detail the manner and method the commission may follow in prorating and regulating the daily gas well production from each common reservoir. The legislature recognized the difficulty of prorating and regulating the production of gas from a common reservoir. To make sure that the commission was not to be bound by any narrow, technical rules in carrying out the objects of this law, the legislature was particular to give the commission broad discretion in the exercise of its power under the provisions of this law." . . .

"The Railroad Commission is not required in administering the oil and gas statutes to be absolutely accurate in its rules and orders. This would be impossible. It is the duty of the commission to treat all interested parties justly and impartially, and the actions and rulings of the commission in attempting to accomplish such results will not be disturbed by the courts unless such rules or orders are clearly illegal, unreasonable, or arbitrary. The power to make rules rests exclusively with the Railroad Commission. Courts may adjudge that a rule of the commission is invalid, but they can not substitute a new rule for the one adjudged invalid."

"'To adjust correlative rights' the commission is authorized by this law to consider many items that relate to the production of gas, and it further provides that the commission shall consider 'all other factors which are pertinent.' The courts have frequently sus-

tained the exception to Rule 37 'to prevent confiscation of property,' (originally 'to protect vested rights'). The criterion fixed by the legislature relating to the adjustment of correlative rights is as definite as that fixed by law to authorize the commission 'to prevent confiscation of property' under Rule 37."

Correlative Rights

"In this case we are concerned with the production of natural gas in a gas field, and also with the question of correlative rights of the various owners of properties in such field. Sub-sections a and b of Section 10 of Article 6008 are not dependent on each other. They are coordinate, and each has its own independent standing in this law. Unquestionably we think that Section 10 of Article 6008 authorizes the Railroad Commission to prorate and regulate the daily gas well production from each common reservoir, in order to prevent waste and adjust correlative rights as provided for in such Sub-sections a and b."

Although the order under attack had been rescinded by the Railroad Commission and was no longer in effect, the court said it felt the questions involved were of such significance that a decision should be entered.

Gas Bills Snarled

The new gas conservation bill pending before the Texas Legislature was left in a snarl at the conclusion of last week's committee hearings. Confusion was so great the House Oil and Gas Mining Committee sent the bill to a sub-committee which was instructed to rewrite the entire measure. The committee, at its hearing, discarded for discussion the bills which had actually been introduced there, and considered a Senate substitute which had never been presented in the House, plus a substitute for the Senate bill.

It appeared very likely that the net result will be no bill at all. This late in the session a two-thirds vote is required to bring a bill up out of order. Since the bill is not out of committee in either House, it is not on the calendar and must be brought up out of order when it is ready. The session is scheduled to end May 8, although it likely will extend for a few days thereafter. Since most of the other controversial bills have not yet come up, the gas bill might never be voted on.

Witnesses who did not get an opportunity to appear at the House hearing will be heard April 12, when the subcommittee appointed to rewrite the measure is to report also. On the same day, the Senate Oil and Gas committee will hold its closed meeting on the bill.

Despite the fact that an "agreed" bill was the measure before both committees, a great deal of opposition developed, both within the industry and among legislators.

Further confusion was added by the Supreme Court decision in the Corzelius case handed down the day before. As a result, authors of the bills were not sure whether their measures extended or restricted the authority of the commission, and witnesses took directly opposing views.

Senator Spears said he would have to be convinced about his own measure, explaining he had not had sufficient time to digest the court decision and fit it into the picture. Representative F. A. G. Swanson opposed the "agreed" bill, although he was author of the House measure for which it was offered as a substitute.

Opponents of the measure argued it represented a backward step in conservation because it placed limitations upon the commission's regulatory powers; that it also proposed to delegate the commission powers over economic matters although statutes of the legislature expressly excluded such authority; and that it would violate the anti-trust laws of the country.

Anti-Trust View

There was much objection to the section providing for voluntary unitization and other voluntary agreements, including marketing of the products therefrom. Many protestants complained this section might well repeal the anti-trust statutes.

More complaint was directed to the section which forbade the commission to require cycling unless the yield of liquids exceeded 1½ gallons "of pentanes and heavier liquid hydrocarbons per one thousand cubic feet of gas processed." Testimony showed that no more than three fields in Texas had yields so high, which meant that the commission would have no authority in most cases.

The section fixing a maximum gas-oil ratio of 2000 to 1 was attacked as curbing the commission's authority and as likely to result in more instead of less flared gas.

One group objected to actions which they said gave the commission authority to prevent economic waste. They contended the commission would have the right to investigate all phases of operating costs if it were to determine whether a particular cycling operation was to be "profitable." Thus, they argued, the commission could demand as evidence all contracts, lease obligations and other basic cost figures.

Members of the Railroad Commission and other proponents of the bill declared it absolutely essential as a means of opposing the Federal Power Commission in its moves to control Texas gas. This seemed to be the primary reason for accepting a bill which all admitted was imperfect, but which proponents insisted was a step in the right direction. Opponents asserted the passage of a statute would not curb the interest of the federal government in gas waste, unless it actually accomplished this.

Proponents declared the court decision did not alter things and that the bill was still needed, but opponents stated the decision gave the commission broader powers than would exist under the proposed bill.

Senator Clint Small, representing Chicago Corporation and Tennessee Gas Transmission Company, declared flare gas was the problem of the oil companies, since it was not the result of gas line operations. He pointed out that gas companies have sufficient reserves to supply their needs, and argued they should not be required to take flare gas unless it was offered in merchantable condition.

To become merchantable, it would have to be stripped, compressed, and then transmitted to lines that could be picked up readily.

Supreme Court Suggests Limits of FPC Powers

The United States Supreme Court, in an opinion upholding the authority of the Federal Power Commission to fix gas rates, has indicated that the powers of the commission are not unlimited under the natural gas act. While FPC has authority to consider all properties of a company in setting rates, the court denied it any powers of control over drilling and spacing of wells and may put other limitations on the commission.

The opinion was rendered by Associate Justice Holmes, upholding the greater part of rate reductions ordered by FPC of Colorado Interstate Gas Company, Canadian River Gas Company, and Colorado-Wyoming Gas Company. However, the methods used by and the findings of the commission were sharply criticized, and $21,000 of a $119,000 rate reduction ordered of Colorado-Wyoming was remanded to the commission for further study, the court declaring that the finding "is so shrouded in doubt that further findings by the commission are necessary."

The court was sharply divided in the cases, with the minority holding that the commission exceeded its jurisdiction when it included gas wells and gas gathering facilities together with transportation and distribution facilities in a single rate base. The majority rejected these contentions, saying that when a natural gas company which owns producing properties or a gathering system is restricted in its earnings by a rate order, the value of all its property is affected.

The natural gas act, the opinion continued, "not only gives the commission authority to determine the adequacy or inadequacy of gas reserves of a natural gas company but also empowers it to determine the propriety and reasonableness of the inclusion in operating expenses, capital, or surplus of all delay rentals or other forms of rental or compensation for unoperated lands and leases."

Justice Holmes indicated the provisions of the act suggests Congress was thinking in terms of all ingredients of a rate base, including deductions made and additions contemplated with no exclusion of property used or useful. He went on to say that this treatment is applicable only to rate making and that the commission has no control over drilling or spacing of wells.

Cortes Succeeds Rust as SEG Head; PAW Describes Foreign Activities

Dr. Henry C. Cortes, Magnolia Petroleum Company, Dallas, was elected president of Society of Exploration Geophysicists at the fifteenth annual conference held in Tulsa, Oklahoma, April 4. He succeeds Dr. W. M. Rust, Jr., Humble Oil and Refining Company, Houston.

Dr. Henry C. Cortes

Other officers chosen include John J. Jakosky, University of Southern California, La Jolla, California, vice president; Dr. Cecil H. Green, Geophysical Service Incorporated, Dallas, secretary-treasurer; Dr. L. L. Nettleton, Gulf Oil Corporation, Pittsburgh, Pennsylvania, editor of "Geophysicist," the society's official bulletin.

At a pre-gathering of SEG members Dr. M. King Hubbert, research geophysicist, Shell Oil Company, Houston, spoke on: "The Strength of the Earth."

Because of wartime travel restrictions this year's conference was attended by about 50 out-of-town members.

Dr. Rust's presidential address was on the topic "Evaluation of New Geophysical Methods." (Reported on page 56.)

Dr. Joseph A. Sharpe, retiring editor of "Geophysicist" read "Foreign Geophysical Activities in 1944" as reported by the office of Petroleum Administration for War, Washington.

Foreign Work Outlined

To meet the greatly increased requirements for oil production in foreign countries which have been established in the world petroleum supply programs for 1945 and 1946, additional drilling in proven foreign fields and exploration to discover new sources of petroleum are necessary, according to PAW. In a presentation of foreign geophysical operations by areas and methods, PAW stressed the need for exploratory wells being drilled to discover new fields which, in turn can be developed to sustain production, meet programmed increases and establish some reserve capacity to meet unforeseen demands.

Geophysical surveys determine the location of suitable areas for exploratory drilling to a large extent, it was shown. "Prospectively favorable areas," the survey said," which had been found by prewar work require further detailing in order that test wells can be located most advantageously. Additional prospects must be found and surveyed because the backlog of such areas is insufficient to sustain an adequate wildcatting program. For all these reasons, it has been found necessary to accelerate the program for foreign geophysical exploration in 1945 as compared with earlier years.

"During 1942 and 1943 very little work in geophysical exploration was carried on in foreign countries. Chiefly because of shortage of tankers the foreign petroleum industry was dependent almost entirely upon its reserves of productive capacity established in previous years and very little additional development was programmed during those years. Toward the end of 1943 these conditions were altered and, during 1944, a program calling for considerable geophysical exploration was approved.

"Detailed reports on the number of geophysical crews in operation during the first half of 1944 were not obtained. Commencing with the third quarter, 64 geophysical parties were engaged in foreign petroleum exploration. This number was increased to 65 during the fourth quarter. Approximately two thirds of the investigations were seismic and about one third gravimetric.

"As compared with 1944, the geophysical work programmed for 1945 contemplates a 50 percent increase in foreign parties. The average of about 65 parties for the last half of 1944 is expected to be increased to an average of about 95 parties for the entire year of 1945. The same approximate proportion of seismic to gravimetric parties will be maintained. Foreign geophysical work is overwhelmingly in the Western Hemisphere, 94 percent of the parties being in the Western Hemisphere during 1944, as compared with 6 percent in the Eastern Hemisphere. Programmed operations for 1945 call for about 95 percent of the parties to operate in the Western Hemisphere, with about two thirds of these concentrated in the Caribbean area."

Russian Oil Exports Are Foreseen by Department

Possibilities that Russia may re-enter the petroleum export field after the war in order to build up foreign credits for the purchase of needed industrial goods are foreseen by Department of Commerce experts who have just completed a study of the Soviet oil industry.

A report on Russia's past activities in oil export by L. M. Horman, of the department's Russian unit, points out that before the war the USSR was an aggressive competitor in an effort to acquire foreign credits to aid industrial expansion at home.

"Between Russia's first and third five-year plans, the oil industry had progressed by steady stages from an output of 12,316,000 metric tons in 1928 to 32,231,000 metric tons in 1938." Horman stated.

"The war years added a terrific impetus for accelerating still further the expansion of so vital an industry. At the same time the impact of enemy action on the centers of oil production was negligible.

"Quite naturally the recent record of the Soviet Union as an important petroleum producer has prompted many observers to inquire whether in the postwar period large quantities of Soviet oil will be available for export to the world market or, as it is sometimes phrased rather alarmingly, whether the USSR will constitute a source of serious competition to the marketing of United States petroleum products. Perhaps the answer to this query may be read in a review of the Soviet Union's past experience in the field of petroleum exports, particularly in the light of such conditions as have tended to favor large shipments abroad."

Subsidies Are Changed for Fields on Stripper Lists

Fourteen additions to the stripper-well premium payment list, nine of them pools with less than nine barrels per day production per well and the other five on the basis of high production cost, have been announced by the Office of Price Administration, with payments to begin as of March 1.

OPA specified 11 pools that cannot take any increase in ceiling prices under the stripper plan, although in counties that have been given county-wide increases, because they were discovered after January 1, 1944; all in Texas the pools are: Garrett, Holliday, Luke, Ord, Williams, Woodbine, Ellis-Strawn, Noodle Central, Batchler, Ewalt and Walsh.

The new pools made eligible for subsidy payments are:

Kansas: Dexter and Faubin, 25 cents per barrel; Hammer, 20 cents; Deerhead-Viola and Valley Center, 35 cents.

Oklahoma: Naval Reserve South, 20 cents; Haydenville (Dutcher) and Jesse (Gilcrease), 25 cents.

New Mexico: East Lusk, 35 cents; Loco Hills, 17 cents.

Mississippi: Carey, 33 cents.

Illinois: Patton, 35 cents.

Kentucky: Reed, 20 cents.

Texas: Harper, 20 cents.

The OPA now has in course of preparation additional orders under which subsidy payments may be granted, effective from April 1, to the following pools:

Kentucky: Livermore (except McClosky), McLean County, 35 cents; Wathen, Upton, 20 cents.

Kansas: Ackerland, Leavenworth, 35 cents; Ferguson East, Elk, 35 cents; Hillsboro, Marion, 2 cents.

Arkansas: McDonald, New, Ouachita, 20 cents.

Louisiana. Bayou Choctaw West, Baton Rouge and Iberville Parishes, 26 cents.

Michigan: Bangor, Van Buren, 20 cents.

Illinois: New Haven, White, 20 cents.

Oklahoma: Homestake, Seminole, 25 cents; Perryman, Tulsa, 35 cents; Spring (Sand), Jefferson, 20 cents; Hewitt West (old) Carter, 25 cents; Burbank, Kay and Osage, 25 cents (formerly separate rates for each county, now classified as one pool with rate computed on average production); Garber North, Garfield County, to be deleted as a gas pool, and Same (Oswego) Noble County, to be taken off list but will be covered by subsidy for Same (Pennsylvania) with which it is now included.

Texas: Morita, Howard, 35 cents; KMA North (Strawn), Wichita, 20 cents; Oakville, Live Oak, 18 cents.

Wyoming: Spindletop (Sundance), Natrona, 25 cents.

Six-Point Purpose of Senate Oil Investigation Group Is Outlined

A six-point program of investigation covering every current major oil problem will be undertaken by the Senate special committee investigating petroleum resources, Chairman Joseph C. O'Mahoney of Wyoming announced April 7. All industry organizations and corporations, as well as the government departments and agencies were invited to participate.

O'Mahoney said it will be the purpose of the committee, "first, to determine the area of agreement among all interested government agencies and groups with respect to facts and policy and then to concentrate public attention upon the consideration of such divergencies of view as may appear."

The program was outlined in a report to the Senate, in which it was pointed out that committee action served to halt the unannounced consummation of an agreement between Petroleum Reserves Corporation and the two companies with concessions in Saudi Arabia for government-financed construction of the Arabian pipe line, and was responsible for the State Department's decision to submit the Anglo-American petroleum agreement for ratification as a treaty.

The six investigations contemplated by the committee are as follows:

Cartels in relation to oil in world trade, embracing such questions as registration of foreign contracts involving restrictions on production, transportation, marketing, etc.; immunity from anti-trust prosecution where companies follow recommendations approved in advance by the government, as under the proposed Anglo-American agreement.

New domestic sources of petroleum, involving the reserves under the coastal waters and in the public lands as well as lands privately owned and going into the soundest program to be followed by the federal government and the states in safeguarding and augmenting oil resources.

The independent company, involving an analysis of the position of the independent in the search for oil and in refining, transportation and distribution, the relationship of the independent to the integrated company, and the application and operation of the anti-trust laws in respect of the functions of both classes of enterprise.

Postwar disposal of pipelines, refineries and tankers, to be studied in cooperation with the special committee on postwar economy policy and planning, and the war contract subcommittee of the committee on military affairs, which are cooperating in an inquiry into the questions involved in the disposal of certain war plants and facilities.

Petroleum requirements of the United States involving anticipated postwar consumption in the usual uses of petroleum and its derivatives, the demand arising from new discoveries and applications of petroleum in industry generally and the relationship between domestic production and requirements and the effect of imports on the domestic industry.

American oil interests in foreign countries, to cover the field of diplomatic protection afforded to American interests in the principal foreign producing areas and including the effect of foreign legislation and policies on American companies, in both producing and consuming countries.

Illinois Pipe Line Hearing Delayed by FPC

Hearings on the petition of Central Illinois Public Service Company for an order directing Panhandle Eastern Pipe Line Company to extend its facilities to connect with Central's distribution system near Mattoon, Illinois, and to sell and deliver enough gas for it to supply its customers, and the application of Kentucky Natural Gas Corporation to construct about 20½ miles of six-inch pipe line from the Panhandle line near Tuscola, Illinois, to a connection with Central's system near Mattoon will be opened by the Federal Power Commission in Chicago April 23.

Crude Oil Production in the United States

(Estimates compiled by The OIL WEEKLY. All figures indicate daily averages, in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED April 7	March 31
Alabama	250	250
Arkansas	80,600	80,200
California	903,750	908,150
Colorado	9,550	10,000
Florida	15	15
Illinois	199,300	187,900
Indiana	10,100	10,350
Kansas	255,450	275,850
Kentucky	16,750	14,600
Louisiana	366,100	365,700
North Louisiana	70,500	71,100
South Louisiana	295,600	295,600
Michigan	47,000	51,050
Mississippi	51,450	52,300
Missouri	100	100
Montana	24,550	23,110
Nebraska	1,000	1,000
New Mexico	104,750	104,750
New York	14,200	12,750
Ohio	6,800	6,650
Oklahoma	374,550	372,950
Pennsylvania	38,600	36,150
Tennessee	35	35
Texas	2,159,050	2,159,050
Upper Gulf Coast	564,500	564,500
East Texas Field	381,000	381,000
Rest of Eastern Texas	146,750	146,750
Lower Gulf Coast	249,700	249,700
Southwest Texas	81,400	81,400
South Central Texas	21,000	21,000
West Texas	477,350	477,350
North Texas	149,300	149,300
Panhandle	88,050	88,050
West Virginia	8,800	8,300
Wyoming	105,900	105,300
Total United States	4,778,650	4,786,510

BUREAU OF MINES REPORT

Total stocks, foreign and domestic, March 31, as reported by the Bureau of Mines were: 223,782,000 barrels with a daily average production of 4,781,000; and runs to stills 4,677,000.

FLOW OF OIL AND GAS

A recent check made by an oil and gas producing company where field men were permitted, under certain conditions, to designate the sizes of field lines disclosed the fact that there was no standard method used to calculate pipe sizes. Also, that many field men were using charts and tabulations of unknown origin.

To overcome the differences, in their calculations, the charts on the two following pages were compiled and all calculators were instructed to use them in their piping problems. These charts are authoritative and the formulas used in compiling them have been satisfactorily used for many years by pipeline engineers.

(Charts by courtesy of Frank E. Richardson of Foreman-Richardson-Baird, Engineers Constructors, Kansas City, Missouri.)

Postwar Airline Needs For Gasoline Described

The commercial air transport market for gasoline and oil will exceed $70 million a year by 1954, G. K. Brower, of American Airlines, Inc., said April 5. He predicted that consumption of gasoline will run to more than 1 billion gallons a year, but expressed the opinion that air lines will be less interested in the superfuels than in a limited number of grades which economically would satisfy varying operating needs.

Dr. R. T. Goodwin, of Shell Oil Company, who proposed a maximum of five grades as satisfactory for every type of plane, beginning with 80-octane for light and medium aircraft, and providing 100-octane only for military use with possibly a higher grade for long-range trans-ocean flying.

Army Needs Oil Men

The War Department is screening its list of officers for men with an oil industry background, urgently needed overseas and especially in the Pacific areas, it was disclosed last week by Maj. General F. B. Gregory, the Quartermaster General.

Officers selected will be given special training in Army and Navy schools, followed by on-the-job training in different phases of military petroleum products work, before being assigned for regular duty.

FLOW OF OIL

THRU PIPES

Those who occasionally have to make computations relating to the flow of fluids through pipe lines may well be confused by the numerous formulas in use, and particularly by the variation in the systems of units employed. The following information has been compiled for the purpose of establishing a simple, fixed procedure. It is recommended, nevertheless, that the calculators shall review the literature on pipeline flow, as it is thought that in this way they will gain confidence in the modified Chezy formula recommended below.

EXPLANATION OF SYMBOLS

B	barrels [42 gal.]	Q	rate of flow barrels [42 gal] per hour
d	inside diameter of pipe [inches]	R	Reynolds number
d_o	outside diameter of pipe [inches]	s	specific gravity [Water = 1]
D	inside diameter of pipe [feet]	t	Saybolt seconds
f	friction factor	t_1	pipe wall, inches
f_1	fiber stress - pounds per square inch	u	absolute viscosity [pounds,foot,second]
h	loss of head in feet of fluid pumped	v	velocity, feet per second
P	friction loss, pounds per 1000 feet	W	weight, tons per mile
P_1	pressure - pounds per square inch	w	weight, pounds per foot
p	density lbs. per cu.ft.[Water = 62.4283 lbs.]	z	absolute viscosity [centipoise]

To convert viscosity, usually reported in U.S.A. in Saybolt seconds, to absolute viscosity in centipoises [z] use the following: $z = s[0.22t - \frac{180}{t}]$. If viscosity is given in English Units [u], convert as follows: $z = 1488.16u$.

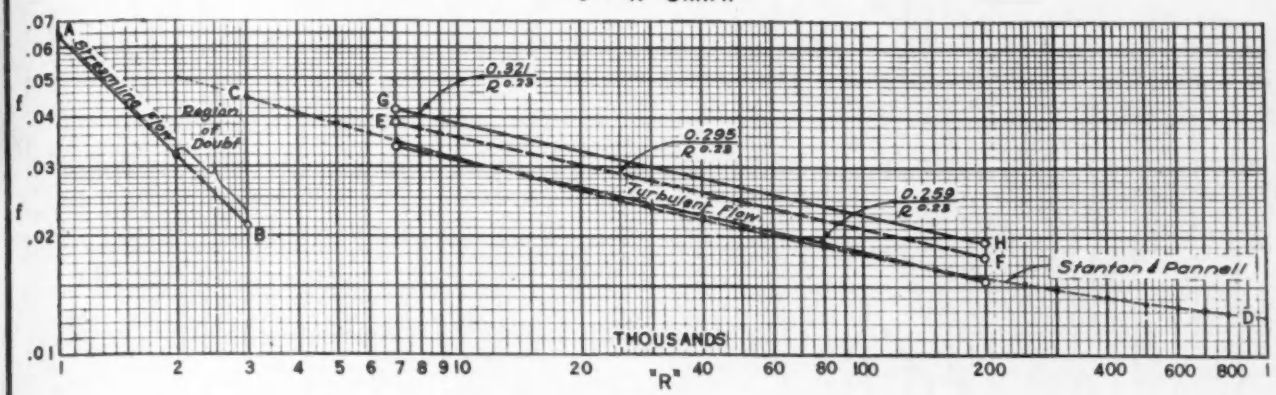
To convert gravity reported in API degrees to specific gravity [s] use the following: $s[60°F/60°F] = \frac{141.5}{131.5 + °API}$

Formula

$$P = \frac{6.61\ fQ^2s}{d^5} \quad [1] \quad \text{or} \quad Q = \left(\frac{Pd^5}{6.61fs}\right)^{1/2} [2] \quad \text{or} \quad d = \left(\frac{6.61\ fQ^2s}{P}\right)^{1/5} [3] \quad \text{or} \quad f = \frac{Pd^5}{6.61Q^2s} \quad [4]$$

The above variants of the Chezy formula, as written by Darcy, account for all mechanical quantities involved excepting the variation in roughness of the pipe wall. Successful application of the formula depends, therefore, on the selection of a proper friction factor [f] and values for "f" for various Reynolds numbers [Dvp/u = 2213.5Qs/dz] may be obtained from the following graph.

f vs R GRAPH



The straight line AB is used for streamline flow or when "R" does not exceed 2,000, its equation is fR = 64. The curve CD is Stanton and Pannell's value of "f" for small, smooth pipe and is used for turbulent flow in new steel pipe 6" and larger in diameter when "R" is 3,000 or more. The interval between R 2,000 and R 3,000 is unstable and the flow may be either streamline or turbulent, so for this range, turbulent value, for "f" should be used. For turbulent flow in new steel pipe, smaller than 6" in diameter, "f" values will exist higher on the scale than CD and these are shown on the graph at EF for 2½" to 4" new steel pipe and at GH for 1½" and 2" new steel pipe.

It will be noted from the foregoing, however, that when rate of flow [Q] is desired for a given pressure drop [P] in a given line, the application of the graph above involves a trial and error procedure that makes its use unattractive To eliminate this procedure it is known to be sufficiently accurate, when "R" is between 7,000 and 200,000, to write for 1½" and 2" new steel pipe that $f = 0.321/R^{0.23}$, for 2½" to 4" new steel pipe that $f = 0.295/R^{0.23}$ and for 6" to 12" new steel pipe that $f = 0.259/R^{0.23}$. By substituting these values of "f" in the formulas [1] [2] and [3] we can write the following formulas:

TURBULENT Flow

1½" and 2"	$P = \frac{0.361\ Q^{1.77}\ s^{0.77}\ z^{0.23}}{d^{4.77}}$	$Q = \left(\frac{Pd^{4.77}}{0.361\ s^{0.77}\ z^{0.23}}\right)^{\frac{1}{1.77}}$	$d = \left(\frac{0.361\ s^{0.77}\ z^{0.23}\ Q^{1.77}}{P}\right)^{\frac{1}{4.77}}$
2½" to 4"	$P = \frac{0.331\ Q^{1.77}\ s^{0.77}\ z^{0.23}}{d^{4.77}}$	$Q = \left(\frac{Pd^{4.77}}{0.331\ s^{0.77}\ z^{0.23}}\right)^{\frac{1}{1.77}}$	$d = \left(\frac{0.331\ s^{0.77}\ z^{0.23}\ Q^{1.77}}{P}\right)^{\frac{1}{4.77}}$
6" to 12"	$P = \frac{0.291\ Q^{1.77}\ s^{0.77}\ z^{0.23}}{d^{4.77}}$	$Q = \left(\frac{Pd^{4.77}}{0.291\ s^{0.77}\ z^{0.23}}\right)^{\frac{1}{1.77}}$	$d = \left(\frac{0.291\ s^{0.77}\ z^{0.23}\ Q^{1.77}}{P}\right)^{\frac{1}{4.77}}$

For STREAMLINE Flow

All Sizes	$P = 0.1911\frac{Qz}{d^4}$	$Q = \frac{Pd^4}{0.1911z}$	$d = \left(\frac{0.1911\ Qz}{P}\right)^{\frac{1}{4}}$

USEFUL FORMULAS

Velocity $v = 0.2859\ Q/d^2$ or $Q = d^2\ v/.2859$ or $d = [0.2859\ Q/v]^{1/2}$

Barlow	$P = 2\ t_1\ f_1/d_o$ or $f_1 = d_o P\ /2t_1$	Pipe Contents 1000'	$B = 0.9714\ d^2$
Pipe Weight	$W = 28.2\ [d_o - t_1]\ t_1$	Pipe Contents mile	$B = 5.1291\ d^2$
Pipe Weight	$w = 10.68\ [d_o - t_1]\ t_1$	Rate of Flow	$GPM = 0.7Q$

FRANK E. RICHARDSON

FLOW OF GAS

TRANSMISSION LINES

WEYMOUTH FORMULA: $$Q_s = 433.45 \frac{T_s}{P_s} \times d^{2.667} \times \left(\frac{P_1^2 - P_2^2}{LST}\right)^{\frac{1}{2}} \quad (a)$$

- LEGEND -

Q_s = rate of gas flow, cu. ft. per 24 hr. measured at Standard conditions
d = internal diameter of pipe, inches
P_1 = initial press. lbs/sq.in. abs.
P_2 = terminal press. lbs/sq.in. abs.
L = length of line, miles
S = specific gravity flowing gas [air = 1]
T = absolute temp. flowing gas [°F. + 460]
T_s = standard absolute temp. [°F. + 460]
P_s = standard press. lbs/sq.in. abs.

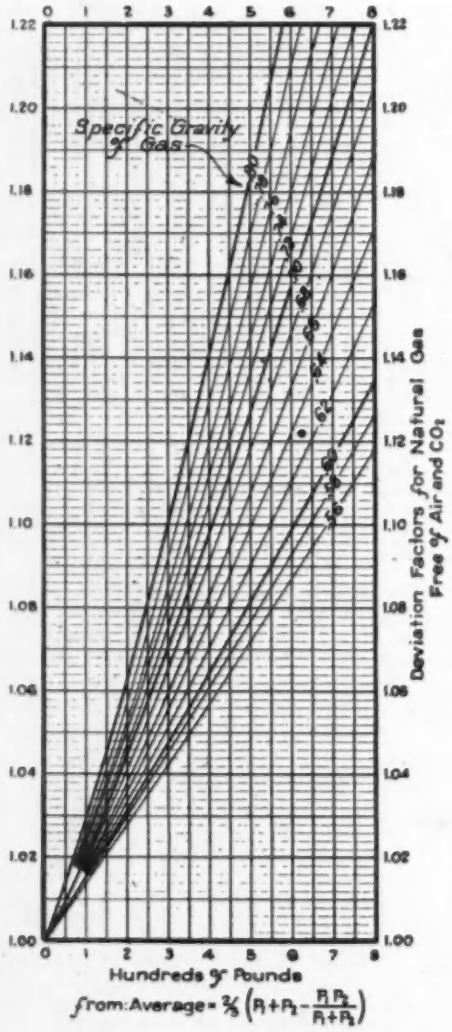
Using values $S = .60$, $T_s = 520°$, $T = 520°$ and $P_s = 14.65\#$ formula is $$Q_s = 871 \times d^{2.667} \times \left(\frac{P_1^2 - P_2^2}{L}\right)^{\frac{1}{2}} \quad (b)$$

Values of $d^{2.667}$ are given in Plate 1 and remainder of formula can be solved by use of squares and square roots; however if S, T and P_s are different than .60, 60° F and 14.65 [14.4 + 4 oz.] multiply Q_s of formula [b] by factors shown in Plates 2, 3 and 4.

The Weymouth Formula agrees more closely with metered rates than those calculated by any other formula, however the degree of error increases with pressure. Late experimenters have found that if the calculations made from Weymouth Formula are increased by the compressibility factor of the gas that the figure will practically coincide with the metered flow. Plate 5 shows compressibility factor of a gas most commonly found in gas lines and can be used safely if exact data is not available on the gas to be transported. The average pressurein the line can be figured by the formula:

$$\text{Average} = \frac{2}{3}\left(P + P_1 - \frac{P_1 P_2}{P_1 + P_2}\right)$$

Plate V.


Specific Gravity of Gas
Deviation Factors for Natural Gas Free of Air and CO_2
Hundreds of Pounds
from: Average = $\frac{2}{3}\left(P + P_1 - \frac{P_1 P_2}{P_1 + P_2}\right)$

FRANK E. RICHARDSON

Plate I.

Values of $d^{2.667}$ for use in $Q_s = 871 \times d^{2.667} \times \left(\frac{P_1 - P_2}{L}\right)^{\frac{1}{2}}$

d	$d^{2.667}$	d	$d^{2.667}$	d	$d^{2.667}$	d	$d^{2.667}$	d	$d^{2.667}$
2.0	6.3	4.2	45.9	6.6	153.3	8.941	344.6	11.3	643.0
2.067	6.9	4.3	48.9	6.7	159.5	9.0	350.5	11.4	658.3
2.1	7.2	4.4	52.0	6.8	166.0	9.1	361.0	11.5	673.8
2.2	8.2	4.5	55.2	6.9	172.6	9.2	371.6	11.6	689.5
2.3	9.2	4.6	58.5	7.0	179.3	9.3	382.5	11.7	705.5
2.4	10.3	4.7	62.0	7.1	186.2	9.4	393.6	11.8	721.7
2.5	11.5	4.8	65.6	7.2	193.3	9.5	404.8	11.9	738.1
2.6	12.8	4.9	69.3	7.3	200.5	9.6	416.3	12.000	754.8
2.7	14.1	5.0	73.1	7.4	207.9	9.7	428.0	12.1	771.7
2.8	15.6	5.1	77.1	7.5	215.5	9.8	439.8	12.2	788.8
2.9	17.1	5.2	81.2	7.6	223.3	9.9	451.9	12.3	806.1
3.0	18.7	5.3	85.4	7.7	231.2	10.0	464.2	12.4	823.7
3.068	19.9	5.4	89.8	7.8	239.3	10.020	467.0	12.5	841.6
3.1	20.4	5.5	94.3	7.9	247.6	10.1	476.6	12.6	859.7
3.2	22.2	5.6	98.9	7.981	254.5	10.2	489.3	12.7	878.0
3.3	24.1	5.7	103.7	8.0	256.0	10.3	502.2	12.8	896.5
3.4	26.1	5.8	108.6	8.1	264.6	10.4	515.3	12.9	915.3
3.5	28.2	5.9	113.7	8.2	273.4	10.5	528.7	13.0	934.4
3.6	30.4	6.0	118.9	8.3	282.4	10.6	542.2	13.1	953.7
3.7	32.7	6.065	122.4	8.4	291.6	10.7	555.9	13.2	973.2
3.8	35.2	6.1	124.2	8.5	300.9	10.8	569.9	13.250	983.9
3.9	37.7	6.2	129.9	8.6	310.5	10.9	584.1	13.3	993.0
4.0	40.3	6.3	135.4	8.7	320.2	11.000	598.5	13.4	1013
4.026	41.0	6.4	141.2	8.8	330.1	11.1	613.1	13.5	1033
4.1	43.1	6.5	147.1	8.9	340.2	11.2	627.9	13.6	1054

Plate II.

Factors to adjust for Specific Gravity(S)

S	factor	S	factor
50.	1.095	60	1.000
51	1.085	61	.992
52	1.074	62	.983
53	1.064	63	.976
54	1.054	64	.968
55	1.045	65	.961
56	1.035	66	.953
57	1.026	67	.946
58	1.017	68	.939
59	1.008	69	.933

Plate III.

Factors to change from flowing temperatures of 60°F to actual flowing temperatures.

°F	factor	°F	factor	°F	factor	°F	factor
50	1.0098	60	1.0000	70	.9905	80	.9813
51	1.0088	61	.9990	71	.9896	81	.9804
52	1.0078	62	.9981	72	.9887	82	.9795
53	1.0068	63	.9971	73	.9877	83	.9786
54	1.0058	64	.9962	74	.9868	84	.9777
55	1.0048	65	.9952	75	.9859	85	.9768
56	1.0039	66	.9943	76	.9850	86	.9759
57	1.0029	67	.9933	77	.9840	87	.9750
58	1.0019	68	.9924	78	.9831	88	.9741
59	1.0010	69	.9915	79	.9822	89	.9732

Plate IV.

Factors to change from Pressure base of 14.4° + 4 oz. to some other Pressure base

New base	abs.lbs.	factor	New base	abs.lbs.	factor
14.4 + 4 oz	= 14.650	= 1.000	14.7 + 2 oz	= 14.825	= .988
30" Hg Abs.	= 14.730	= .995	14.7 + 4 oz	= 14.950	= .980
14.4 + 8 oz	= 14.900	= .983	14.7 + 10 oz	= 15.325	= .956
14.4 + 10 oz	= 15.025	= .975	14.7 + 2 lb	= 16.700	= .877

PROBLEM: Calculate the capacity of a 6.06" I.D. gas pipe line 7 miles long, inlet and outlet pressures 800 and 400# absolute, respectively, specific gravity .63, flowing temperature 68° F., pressure base 14.4 + 10 oz.

Using Formula (b), we have: 871 x 122.4 x 261.9, or 27,921,264 cubic feet.

Corrected for specific gravity (.63), flowing temperature (68° F.), pressure base (14.4 + 10 oz.), and compressibility, we have:

27,921,264 x .976 x .9924 x .975 x 1.122, or 29,584,833 cubic feet.

Some Points on MER—

Oil Fields Strained But Ultimate Figure Not Yet Reached

ALTHOUGH March allowable production in PAW District 3 totals 228,713 barrels per day more than the district's total estimated maximum efficient producing ability according to the Ivy Committee report (THE OIL WEEKLY, April 2), there are still some fields in the area not yet producing up to their full capacity. A study shows 133 fields are producing 50 barrels or more under their estimated maximum ability, and that these have a total of 64,713 barrels of additional producing capacity, 53,936 barrels of which is located in Texas fields.

This much additional crude oil can be produced without exceeding estimated efficient rates, and authorities charged with responsibility of supplying oil for the nation's war machine undoubtedly will closely scrutinize these fields in an effort to make more petroleum available. Unfortunately, this additional oil is located in relatively small amounts widely scattered throughout the district. The problem of making this additional oil available also is complicated by the fact many of the fields may not have pipe line or other outlets sufficient to move larger quantities than their current output, and some produce crudes undesirable or unnecessary for the prosecution of the war.

Figures Said Conservative

Neither the state regulatory bodies nor the PAW have shown any desire to injure permanently important sources of production. The Ivy Committee report is an estimate as to just how much the fields can produce over an extended period of time without injury. Many feel that the estimates on certain prolific fields are conservative, and should be. However, they also feel that many of the fields have never been called upon to produce more than the estimated maximum efficient rate, and may prove to be capable of much greater productive capacity. It seems reasonable, that if permanent and irreparable injury were being sustained by very many fields, the operators in these fields would call upon regulatory boides for reductions. Some of the major fields have been found by the Ivy Committee to deserve increases in estimates of MER even after more than a year of record production.

These points were brought out as being indicative that although the producing capacity of the district has been strained beyond any point thought possible a number of years ago, it has not reached its ultimate.

Fields Producing Fifty Barrels or More Under Their Estimated Daily Ability

(Barrels per day)

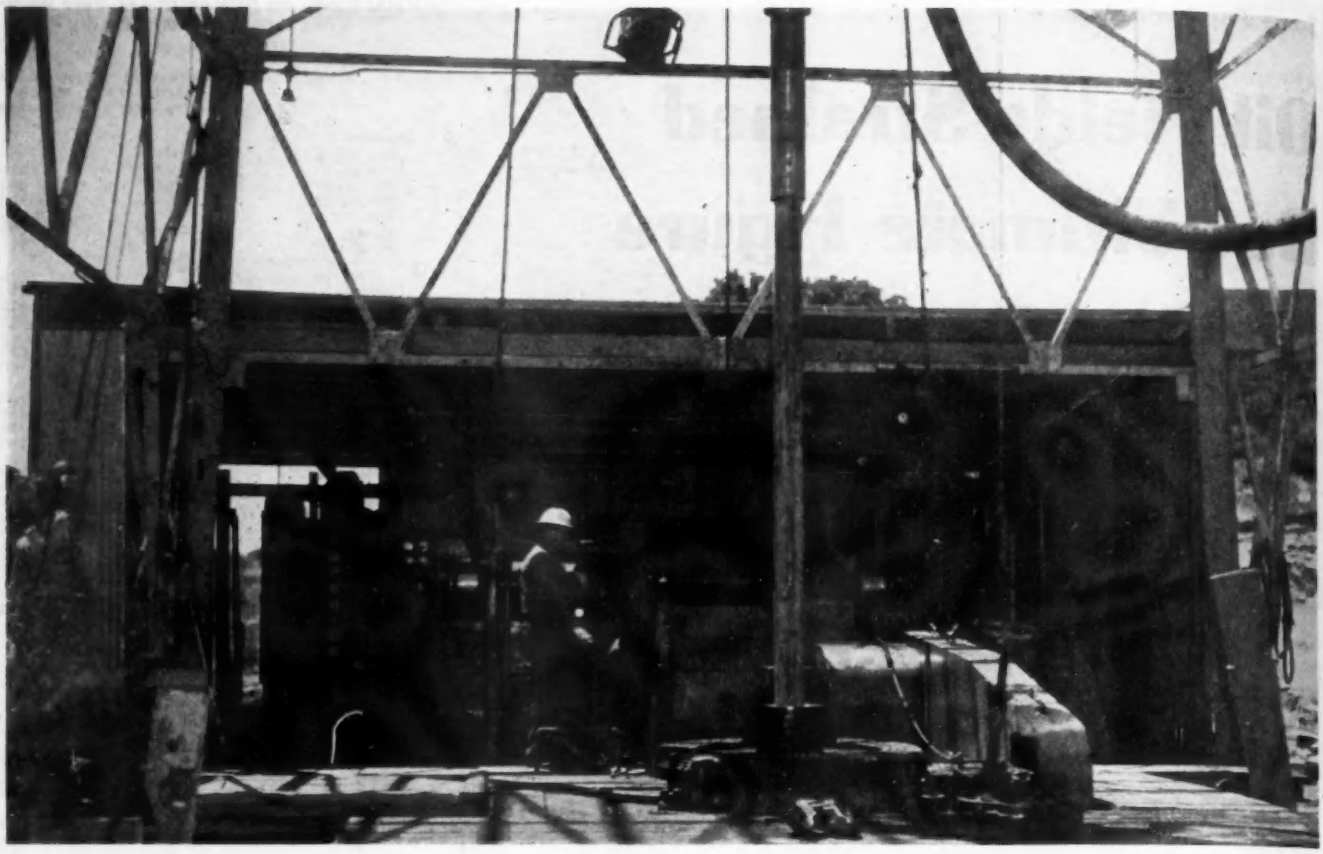
	Estimated Ability to Produce*	Estimated March Production
Arkansas	2,850	2,507
Louisiana	91,614	85,825
Mississippi	1,100	450
New Mexico	47,600	43,675
Texas	609,005	555,069
Total District 3	**752,169**	**687,526**
Arkansas:		
Dorcheat-Macedonia	2,850	2,507
Total Arkansas	**2,850**	**2,507**
Louisiana:		
Avery Island	2,500	2,100
Bastian Bay	300	250
Bay St. Elaine	900	800
Bayou Blue	1,950	1,850
Bayou Sale	7,700	7,300
Belle Isle	330	150
Bully Camp	1,000	750
Caillou Island	5,800	5,700
Cameron Meadows	1,200	1,150
Catahoula Lake	450	289
Delhi	640	436
Garden Island	3,500	3,400
Gibson, Northeast	4,200	4,000
Good Hope	920	800
Hackberry, W.	6,650	6,400
La Fitte	11,900	11,500
Lake Barre	600	500
Lake Washington	500	450
Lockport	900	650
North Ritchie	320	250
Potash	1,400	1,250
Quarantine Bay	8,000	7,700
Roanoke	2,400	1,900
Shutestown	264	200
Starks	450	400
Tepetate	2,000	1,950
Tepetate, W.	750	500
Venice	10,000	9,700
Vermilion Bay	150	100
Vinton	7,440	7,100
White Castle	4,000	3,900
Woodlawn	2,500	2,400
Total Louisiana	**91,614**	**85,825**
Mississippi:		
Baxterville	600	150
Mallalieu	500	300
Total Mississippi	**1,100**	**450**
New Mexico:		
Caprock	300	100
Eunice	17,000	16,500
Loco Hills	3,250	2,950
Monument	22,000	19,500
Rhodes	1,100	950
Salt Lake	250	175
South Lovington	2,500	2,500
West Eunice	1,100	1,000
Total New Mexico	**47,600**	**43,675**
Texas:		
District 1		
Darst Creek	9,300	9,175
Imogene	480	400
Total District 1	**9,780**	**9,575**
District 2		
Bonnie View	400	300
Cabeza Creek	100	50
Caesar, South	2,100	1,975
Ganado, Deep	1,720	1,550
Greta	10,000	8,970
Keeran	900	775
Koontz	160	75
La Rosa	4,500	4,400
Maubro	2,000	1,900
Pettus	900	475
Refugio-Fox	650	550
Runge	400	267
West Ranch	22,000	20,678
Total District 2	**45,830**	**41,965**

Fields Producing Fifty Barrels or More Under Their Estimated Daily Ability

(Barrels per day)

	Estimated Ability to Produce*	Estimated March Production
District 3		
Alta Loma	450	390
Amelia	4,500	4,430
Big Creek	650	500
Blue Ridge	800	650
Cedar Point	1,700	1,400
Conroe	65,000	63,700
Daboval	170	100
Danbury Dome, 5655' Sd.	800	745
Dyersdale	1,800	1,750
Hankamer, Old	650	575
Hastings	65,000	63,757
La Belle	1,250	1,200
Lake Creek	250	200
Lovell's Lake	4,500	4,450
Markham, N. Cornelius	4,500	4,100
Needville	600	400
Oyster Bayou	6,500	6,425
Port Neches, West	1,300	1,250
Raccoon Bend, Cockfield	9,000	8,800
Satsuma	450	400
Seabreeze	3,000	2,000
Segno, Deep	2,750	2,675
Smith Point	800	700
South Houston	5,400	5,300
Spring	300	200
Thompson	30,000	29,300
West Columbia	2,050	2,000
Total District 3	**214,170**	**207,397**
District 4		
Agua Dulce	100	32
Alta Mesa	1,500	1,450
Canales	800	640
Conoco-Driscoll	3,000	2,900
Flour Bluff	1,200	1,150
Longhorn	960	900
Magnolia City	400	325
Nichols	275	225
Odem	2,200	2,025
Rincon, North	1,500	1,050
Riverside (E. Riverside)	250	200
Rooke	800	600
Ross	800	750
Seven Sisters	6,350	6,250
Sun, North	1,700	1,650
Thomas Lockhart	200	150
Total District 4	**22,035**	**20,297**
District 5		
LaRue	180	50
Myrtle Springs	85	25
Van	35,000	33,710
Total District 5	**35,265**	**33,785**
District 6		
Long Lake	6,200	4,800
Manziel	2,000	1,700
Navarro Crossing	500	280
Pittsburg	1,500	1,300
Total District 6	**10,200**	**8,080**
District 7-B		
Callihan County	600	550
Total District 7-B	**600**	**550**
District 7-C		
Barnhart	3,800	3,770
McCamey	9,000	8,900
Olson	275	150
Todd, Deep	3,000	1,200
Total District 7-C	**16,075**	**14,020**
District 8		
Cedar Lake	2,300	2,200
Crossett	630	500
Embar-Ellenburger	3,500	3,400
Emma	3,000	2,700
Fuhrman-Mascho	5,000	4,300
Fullerton	15,000	14,000
Goldsmith	25,000	24,300
Henderson	10,000	4,500
Keystone-Ellenburger	5,600	900
Keystone-Lime	1,200	1,100
Magnolia-Sealy, S.	700	600
Masterson 3500'	200	100
McElroy	35,000	30,500
Monahans	1,060	750
Ownby	850	650
Sand Hills Ellenburger, W.	270	200
Sand Hills McKnight	2,000	440
T.X.L.	200	100
Walker	1,100	1,050
Wasson 72	500	300
Weiner	1,800	1,700
Yates	50,000	37,100
Total District 8	**164,910**	**111,390**
District 10		
Panhandle	90,000	88,000
Ross Ranch	140	10
Total District 10	**90,140**	**88,010**
TOTAL TEXAS	**609,005**	**555,526**

* Represents average or sustainable rates for six month period between April 1 and September 30, 1945, as estimated by Ivy Sub-Committee on Reserves and Development.



Two six-cylinder diesel engines arranged for driving a heavy-duty rig on a California wildcat

Diesel Power Oil Drilling in California

Two six-cylinder engines, among first heavy-duty diesels used on the Pacific Coast, can be compounded or operated as separate units

AMONG the first heavy-duty diesel power units to be used on the Pacific Coast for drilling 8000-foot wells is that operated by the O. J. Riley Company in drilling No. A-15 on the Chanslor-Canfield-Midway Oil Company's Hobson Lease in Padre Canyon, 10 miles north of the Ventura field.

The drilling equipment consists of two 6-cylinder 8½x10½ diesels to operate the draw works and a 7¾x16 mud pump.

A second, separate mud pump is a 7¾x18, driven by an 8-cylinder, 8½x10½ diesel.

The 6-cylinder diesels are rated at 260 brake horsepower at 800 revolutions per minute with a radiator. The 8-cylinder unit is rated at 335 brake horsepower at 800 revolutions per minute with a radiator. Low operating cost, ease of maintenance, lack of fire hazard and portability are cited as interesting features for this type of installation. No engine maintenance mechanic has been needed, and the rig crew handles lubrication and general operation utility satisfactorily.

Portability was emphasized when the equipment was moved from A-13 to the Hobson A-15 site. The draw works breaks down into pieces which were found easy to transport over the steep Padre Canyon grades. The dimensions and weights of the diesels offered no transportation difficulties.

Hobson A-15 will be drilled to an 8000-foot zone. An 11¾-inch surface string was set at 600 feet. A 10¾-inch hole will be drilled with 4½-inch drill pipe all the way to bottom. Casing will be run to bottom, cemented, and gun-perforated.

In the last completion at A-13 the casing was run and landed through the producing zone. The production string was shot with a 40-shot 4-way gun. A total of 2960 shots were fired. All perforations were one half inch.

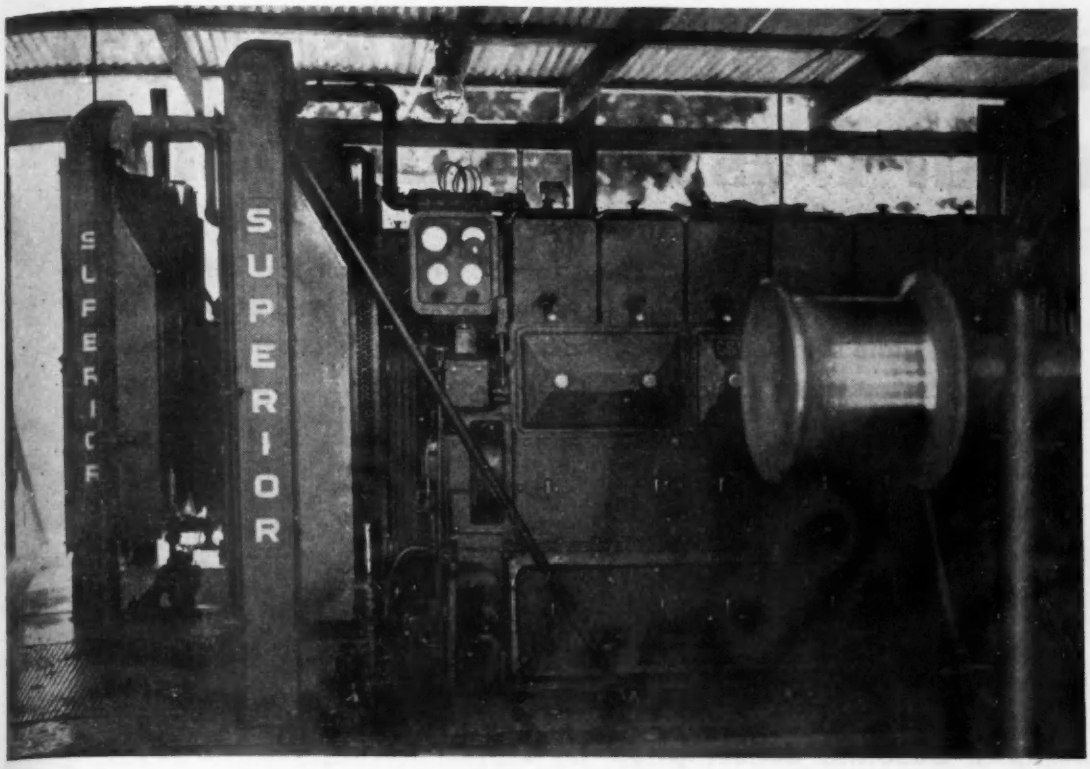
Diesel Flexibility

All of the diesel engines are completely enclosed with dustproof and oil-tight covers. Working parts are accessible because the covers can be removed from the large frame openings to permit easy inspection and adjustment. The parts normally requiring service are light enough in weight to permit easy handling by one man, and the conventional design makes the service of a skilled diesel engineer unnecessary.

The horsepower ratings are reportedly conservative and permit a large overload capacity for temporary emergencies and for quickly starting out of the hole with a long drill pipe load.

The engine bed plate is deep and ribbed to insure rigidity. The forged crankshaft is fitted with counterweights to prevent vibration. The cylinder block and upper crankcase is a single rigid machined casting. Cover plates fitted to front and rear permit access to all parts in the crankcase and the removal of the camshaft regardless of space limitations within the length of the engine.

The cylinder heads have uniform sections and large water passages. Each head supports its own rocker arm shaft and contains spray nozzle, air starting check valve, air starting valve, and one exhaust and one inlet valve. Each piston is fitted with six rings. The steel wrist pins are hollow bored, hardened and group to permit a free turning of the



Two six-cylinder diesel engines with radiators arranged for draw works operation. Large inspection plates render moving parts accessible. Both engines can be compounded or operated separately—one on the draw works and the other driving a mud pump.

pin in both rod and piston, thus avoiding distorition of the piston.

Engine Fuel System

Fuel injection pumps are of the jerk-pump type, and are mounted directly above the engine camshaft. The quantity of diesel fuel injected is regulated by the rotation of the pump plungers with a helical groove so arranged as to vary the cut-off of effective stroke of the plunger. This system is explained as giving clean combustion and good fuel economy through a wide range of speeds and loads.

Load balance between cylinders is obtained by the adjustment of calibrated racks on each pump which rotate the grooved pump plungers. No packing is used in the spray valves or pump plungers. All of the fuel pumps draw their fuel from a common supply line under pressure maintained by a built-in fuel transfer pump of a rotary type. Fuel economy compares well with much larger and slower speed engines. Consumption of less than 0.4 pound per brake horsepower hour at full load is not uncommon.

The engine lubricating system is of the full pressure, wet-sump type, and operates through a main filter and by-pass filter to assure sustained purification. The pressure pump is mounted on the control end of the engine. The gear type pump takes oil from the sump in the engine base and forces it through the filters and shell-and-tube cooler, and through a header to the main bearings. The oil then passes through the drilled crankshaft to the crank pin bearings, then through the rifle-drilled connecting rods to the piston pins under pressure. Additional oil lines from the header supply the governor, overhead valve gear and other working parts.

Engine Speed Control

Engine speed is controlled by a vertical centrifugal type governor, enclosed in a dust-proof and oil-tight housing, and gear driven. It is connected by a suitable linkage to each individual fuel pump rack to regulate the fuel admitted by a variable cut-off of the effective fuel pump plunger stroke.

The drilling rig is designed to accommodate two internal combustion engines having a maximum combined nominal input of 500 horsepower to the draw works and for drilling operations to 7500 feet with 4½-inch drill pipe. The complete rig includes the draw works and transmission unit, two engine drive units, and a main sub frame which supports all these units as a group and maintains proper alignment. Provision is made for compounding both engines so that their combined power may be used for hoisting operations, or for driving the rotary table and mud pump at their required speeds while drilling.

Draw Works and Drum Shaft

The draw works has a selection of six hoisting speeds and three rotary drive speeds and consists of two units; the hoisting drum unit, and a heavy duty transmission unit with three forward speeds and gear reverse including master clutch shaft and jack shaft. These two units have separate skid bases and are bolted together in alignment to form a compact arrangement. They can be readily disconnected for transporting. A single control over all of the draw works operations is provided by means of the master friction clutch which engages the engine drive.

The drum shaft low speeds are obtained through a jaw clutch sprocket equipped with a gear-tooth spline-drive connection from the sprocket to the hoisting drum. This arrangement eliminates any sliding clutch keys in the shaft, thereby transmitting the torque directly from the sprocket to the hoisting drum.

The transmission is incorporated in the unit construction of the draw works and employs a 2-inch pitch, double strand chain to furnish the forward speeds, and constant mesh helical gears for reverse. Speed selections for the close-coupled drives from the master clutch shaft are made by jaw clutches. An inertia brake on the master clutch shaft outside the transmission housing facilitates the shifting of the transmission clutches and also stops the catheads.

Controls

All draw works controls are conveniently located at the driller's station. The master clutch, inertia brake, and engine throttles are operated from the driller's handwheel. A dual handwheel throttle control enables the driller to control the speed of the two engines from the extended cathead position. The throttle control at the driller's position permits either a coordinated control over both engine speeds or a single control over either engine as desired.

A single hand lever provides the means for shifting the transmission clutches, while foot pedals operate the drum shaft high and low speed clutches as well as the rotary drive clutch. The foot pedals do not overhang the draw works frame, eliminating the necessity of removing them while transporting the unit.

Various types and sizes of internal combustion engines are applicable as drives for the Type 75 rig. Each engine is mounted on a separate skid frame together with a shaft extension which is supported on self-aligning roller bearings. The engine frames are adjustable, mounted crosswise on the main sub base. The rear engine frame is notched out to provide for V-belt clearance when the mud pump is placed below derrick floor level. This arrangement has been utilized at the Hobson A-15. Power is transmitted from the engines to the master clutch shaft on the draw works by 1½-inch triple roller chain, while the compound and mud pump drives are by V-belts.

Domestic Gasoline Use Near Prewar Despite Rationing

Military activities within country and all-out production for war require nearly all gasoline saved by elimination of unnecessary civilian use, while shipments abroad make total use unprecedented

By L. J. LOGAN, Associate Editor

IN SPITE of continued strict avoidance of unnecessary use of gasoline through rationing, the United States used within its own borders only 6 percent less in 1944 than in pre-fighting 1941, having experienced a sharp increase in domestic consumption during 1944. This fact is revealed in tabulation of figures on domestic consumption, by states, as compiled by the American Petroleum Institute. These figures are based on returns made under state gasoline tax or inspection laws and reflect as closely as possible the total domestic consumption of gasoline, whether taxable, subject to refund, or not. The figures are believed to be within 2 or 3 percent of domestic demand as calculated by the United States Bureau of Mines, which is not publishing such figures under wartime censorship.

As shown in a table herewith, the consumption by states was more than 15 percent greater in 1944 than in 1943, and the 1944 use was only 6 percent under that in 1941. The sharp gain in 1944 went a long way toward canceling out the declines of 12 percent in domestic consumption in 1942 and 8 percent in 1943.

Changes in Gasoline Consumption, by States, During War Period

(Data from American Petroleum Institute, being based on returns made under state gasoline tax or inspection laws and reflecting as nearly as possible the total consumption of gasoline, whether taxable, subject to refund, or not.)

THOUSANDS OF GALLONS

STATE	*State Tax per Gallon, Dec., 1944 (Cents)	CONSUMPTION IN DECEMBER				Percent Change of 1944		CONSUMPTION DURING YEAR				Percent Change of 1944	
		1941	1942	1943	1944	From 1941	From 1943	1941	1942	1943	1944	From 1941	From 1943
Alabama	6	28,564	16,857	22,975	23,027	— 19.4	+ .3	328,414	309,800	261,349	264,123	— 19.6	+ 1.1
Arizona	5	12,492	8,992	14,062	10,081	— 19.3	— 28.3	128,157	127,207	127,793	129,505	+ 2.1	+ 1.3
Arkansas	6½	21,262	13,894	15,015	15,068	— 29.1	+ .4	224,278	206,773	179,444	179,270	— 20.1	— .1
California	3	175,208	178,799	242,228	324,575	+ 85.3	+ 34.0	2,152,549	2,235,256	2,493,378	3,355,178	+ 55.8	+ 34.6
Colorado	4	19,282	15,477	18,547	21,352	+ 10.7	+ 15.1	267,029	244,931	241,228	297,077	+ 11.3	+ 23.2
Connecticut	3	36,074	23,151	23,433	23,043	— 36.1	— 1.7	421,468	337,459	260,372	273,223	— 35.2	+ 4.9
Deleware	4	5,667	3,553	4,027	3,751	— 33.8	— 6.9	68,118	54,607	48,010	50,210	— 26.3	+ 4.6
District of Columbia	3	17,044	10,161	9,218	9,220	— 45.9	+ 0.0	191,552	149,733	105,538	108,562	— 43.3	+ 2.9
Florida	7	44,815	36,116	31,878	34,337	— 22.3	+ 7.7	475,696	441,126	366,452	381,489	— 19.8	+ 4.1
Georgia	6	40,221	26,615	31,636	34,501	— 14.2	+ 9.1	449,933	382,019	348,922	384,803	— 14.5	+ 10.3
Idaho	5.1	8,490	5,492	7,670	7,227	— 14.9	— 5.8	117,011	106,102	95,009	102,584	— 12.3	+ 8.0
Illinois	3	133,209	63,747	93,793	87,741	— 34.1	— 6.9	1,637,445	1,415,704	1,164,583	1,166,326	— 29.7	+ .1
Indiana	4	67,038	40,535	56,553	47,893	— 28.6	— 15.3	821,703	741,625	672,544	693,323	— 15.6	+ 3.1
Iowa	3	47,605	29,258	36,141	30,699	— 35.5	— 15.1	612,269	543,939	484,418	501,411	— 18.1	+ 3.5
Kansas	3	39,999	23,453	29,453	28,720	— 28.2	— 2.5	540,622	487,206	437,080	442,165	— 18.2	+ 1.2
Kentucky	5	28,372	17,637	19,867	18,915	— 33.3	— 4.8	333,417	281,314	237,270	245,140	— 26.5	+ 3.3
Louisiana	7	28,194	15,927	27,398	27,559	— 2.3	+ .6	343,508	301,619	302,302	313,125	— 8.9	+ 3.6
Maine	4	12,996	8,723	9,330	10,042	— 22.7	+ 7.6	173,811	133,895	111,708	130,728	— 24.8	+ 17.0
Maryland	4	32,263	22,805	24,357	26,560	— 17.7	+ 9.0	365,521	313,434	270,787	295,369	— 19.2	+ 9.1
Massachusetts	3	67,206	43,396	45,421	46,268	— 31.2	+ 1.9	804,496	607,089	488,992	537,849	— 33.1	+ 10.0
Michigan	3	112,220	65,752	81,034	84,810	— 24.4	+ 4.7	1,392,274	1,201,730	978,851	1,083,842	— 22.6	+ 10.7
Minnesota	4	46,305	32,472	34,692	32,041	— 30.8	— 7.6	608,213	547,244	442,450	463,237	— 23.8	+ 4.7
Mississippi	6	23,326	20,041	22,773	15,404	— 34.0	— 33.4	258,833	255,327	234,681	231,378	— 10.6	— 1.4
Missouri	2	65,649	35,269	34,751	37,802	— 42.4	+ 8.8	775,837	644,095	521,872	511,899	— 34.0	— 1.9
Montana	5	9,738	6,947	7,540	7,382	— 24.2	— 2.1	148,387	126,907	110,341	116,316	— 21.6	+ 5.4
Nebraska	5	18,999	13,266	16,517	16,596	— 12.6	+ .5	251,545	234,926	215,391	216,974	— 13.7	+ .7
Nevada	4	3,701	3,334	5,426	3,337	— 9.8	— 38.5	46,283	48,721	42,256	59,200	+ 28.0	+ 40.1
New Hampshire	4	8,527	4,900	4,912	5,190	— 39.1	+ 5.7	108,455	77,575	54,745	65,682	— 39.4	+ 20.0
New Jersey	3	84,364	55,739	62,980	56,544	— 33.0	— 10.2	1,001,201	808,128	663,843	691,877	— 30.9	+ 4.2
New Mexico	5	10,050	6,792	8,169	9,443	— 6.0	+ 15.6	122,194	98,647	99,564	110,582	— 9.5	+ 11.1
New York	4	164,058	110,105	113,369	113,656	— 30.7	+ .2	2,049,453	1,585,338	1,268,045	1,392,530	— 32.0	+ 9.8
North Carolina	6	48,308	30,078	33,652	31,336	— 35.1	— 6.9	542,774	425,540	382,717	408,283	— 24.8	+ 6.7
North Dakota	4	10,389	7,346	8,403	8,095	— 22.1	— 3.7	165,782	164,996	154 158	171,229	+ 3.2	+ 11.1
Ohio	4	140,136	88,917	108,833	100,475	— 28.3	— 8.0	1,639,314	1,472,565	1,250,830	1,365,852	— 16.7	+ 9.2
Oklahoma	5½	43,719	20,315	31,205	47,119	+ 7.8	+ 51.0	477,436	422,800	400,096	477,930	+ .1	+ 19.5
Oregon	5	24,699	16,373	19,378	21,631	— 12.4	+ 11.6	303,646	279,815	255,326	263,068	— 13.4	+ 3.0
Pennsylvania	4	144,146	86,864	96,659	89,503	— 37.9	— 7.4	1,704,947	1,389,068	1,066,164	1,132,475	— 33.6	+ 6.2
Rhode Island	3	11,906	9,873	9,797	11,220	— 5.8	+ 14.5	147,280	119,231	103,527	120,664	— 18.1	+ 16.6
South Carolina	6	23,924	15,250	16,846	17,163	— 28.3	+ 1.9	275,320	217,950	188,663	198,026	— 28.1	+ 5.0
South Dakota	4	11,151	9,601	9,736	8,840	— 20.7	— 9.2	152,624	143,612	130,747	133,611	— 12.5	+ 2.2
Tennessee	7	39,964	26,808	24,756	25,688	— 35.7	+ 3.8	385,816	360,816	318,113	333,936	— 13.4	+ 5.0
Texas	4	135,690	98,671	253,007	369,554	+172.4	+ 46.1	1,673,237	1,741,021	2,624,739	4,104,157	+145.3	+ 56.4
Utah	4	8,903	8,578	8,325	9,352	+ 5.0	+ 12.3	116,893	113,287	102,130	104,561	— 10.5	+ 2.4
Vermont	4	5,639	3,293	3,569	3,746	— 33.6	+ 5.0	75,189	53,859	41,157	44,980	— 40.2	+ 9.3
Virginia	5	44,116	25,461	32,292	34,361	— 22.1	+ 6.4	497,356	403,026	385,339	433,324	— 12.9	+ 12.5
Washington	5	38,697	31,488	29,750	31,715	— 18.0	+ 6.6	442,516	437,215	403,095	376,619	— 14.9	— 6.6
West Virginia	5	20,160	13,965	14,389	11,742	— 41.8	— 18.4	240,188	195,900	152,303	159,548	— 33.6	+ 4.9
Wisconsin	4	49,214	31,243	37,548	†37,000	— 24.7	— 1.5	636,223	571,435	465,526	†486,002	— 23.6	+ 4.4
Wyoming	4	5,571	3,389	4,366	6,907	+ 24.8	+ 58.2	79,049	61,767	52,952	70,720	— 10.5	+ 33.6
Total	....	2,219,270	1,488,723	1,897,676	2,078,231	— 6.4	+ 9.5	26,775,262	23,664,250	21,806,800	25,179,962	— 6.0	+ 15.5
Daily Average	....	71,589	48,023	61,215	67,040	— 6.4	+ 9.5	73,357	64,834	59,745	68,798	— 6.2	+ 15.2

* In addition to these state taxes there is a Federal tax of 1½ cents per gallon.
† Wisconsin consumption in December, 1944, estimated by **The Oil Weekly**; not yet reported by A. P.I.

Total Demand for Gasoline at Record High This Year, as Heavy Military Use More Than Offsets Curb of Normal Use

(Table based on Bureau of Mines figures except for this year; data for 1945 based on American Petroleum Institute weekly bulletin.)

THOUSANDS OF BARRELS

DATA ON GASOLINE	FEBRUARY					Percent Change of 1945		FIRST 2 MONTHS					Percent Change of 1945	
	1941	1942	1943	1944	1945	From 1941	From 1944	1941	1942	1943	1944	1945	From 1941	From 1944
Production (straight run, cracked, nat. blended)	46,841	49,688	41,699	54,369	60,037	+28.2	+10.4	98,014	108,088	86,824	111,326	124,398	+26.9	+11.7
(Daily Average)	1,673	1,774	1,488	1,875	2,144	+28.2	+14.3	1,661	1,832	1,472	1,855	2,108	+26.9	+13.6
Imports	452							452						
Change in Stocks, Finished	+5,387	+6,697	+4,392	+3,519	+6,353	+17.9	+80.5	+10,754	+13,773	+12,095	+9,045	+11,217	+ 4.3	+24.0
Stocks, Beginning of Period	83,310	93,489	78,475	70,490	78,486	— 5.8	+11.3	77,943	86,413	70,772	64,964	73,622	— 5.5	+13.3
Stocks, End of Period	88,697	100,186	82,867	74,009	84,839	— 4.3	+14.6	88,697	100,186	82,867	74,009	84,839	— 4.3	+14.6
Demand (Exclusive Small Imports)	41,454	42,991	37,307	50,850	53,684	+29.5	+ 5.6	87,260	94,315	74,729	102,281	113,181	+29.7	+10.7
(Daily Average)	1,480	1,535	1,332	1,753	1,917	+29.5	+ 9.4	1,479	1,599	1,267	1,705	1,918	+29.7	+12.5

These figures are of great significance in emphasizing the heavy responsibility that the industry carries merely in supplying all the gasoline that is needed within the United States, besides which there must be shipped abroad additional large volumes. While the nation used at home almost as much gasoline in 1944 as in 1941, despite rationing, it apparently also was called upon to deliver into war theatres in 1944 approximately 1 barrel for every 4 barrels consumed in "the states." The total demand for gasoline in 1944, domestic and export, was the greatest in history, having been about 6 percent higher than in 1941.

The fact that domestic consumption has climbed back close to 1941 proportions, in the face of rationing, is explainable in part by further increased consumption at home for training and other military purposes. Furthermore, industrial production for war-waging was intensified in 1944 toward an all-out basis, and this intensification evidently required greater civilian use of gasoline through supplementary rations. The figures herewith do not offer clear evidence as to the relative importance of the gains in military and civilian consumption within the country, for both military training and production for war are well spread out among the states, while some states are using gasoline heavily for both military and industrial purposes, as for example Texas and California.

As far back as a year ago it was estimated that total military use of gasoline, at home and abroad, represented one third of the nation's production of that product, while the other two thirds of production went into normal use. Since production has been substantially stepped up since a year ago, the ratio of total military and civilian use may have remained about unchanged.

While the figures here tabulated show relatively large consumption of gasoline in 1944, the use of this important war-waging product in the early part of this year has been greater than ever before for the months involved. In the first 2 months of 1945 the daily average total demand for gasoline was 12.5 percent larger than in January-February, 1944, preliminary estimates indicate. These figures reflect, of course, continued all-out war against Germany as well as the intensified warfare against Japan. And with the war in Europe now apparently near an end, it is conjectural to an important degree as to the course of gasoline consumption for 1945 as a whole.

Of the 48 states of the Union, 36 consumed more gasoline in 1944 than the year before, although the increases were less than 10 percent for all but 13 of the 36. The greatest increases were in Texas and California, which even in 1943 had been heavy users. Other states that showed important gains percentage-wise include Colorado, Nevada, and Wyoming.

Nevertheless, as stated before, the United States as a whole consumed 6 percent less gasoline in 1944 than in 1941, and only 7 states used more than in 1941, their gains above pre-war having been less than the aggregate declines for remaining states. Greatest among the gains for 1944 over 1941 was that in Texas, which used 2½ times as much as in 1941. Second largest gain was that of 56 percent over 1941 for California. The other 5 increases were 2 percent above 1941 for Arizona, 11 percent for Colorado, 28 percent for Nevada, 3 percent for North Dakota, 1/10 of 1 percent for Oklahoma. In 1943 only Texas and California had consumed at higher rates than in 1941.

The remarkably heavy consumption of gasoline in Texas and the noteworthy large use in California are explained by heavy concentrations of military and war-production activities in those large coastal states. Into both states there have been great influxes of new civilian population as well as military personnel. By virtue of military service or work in war plants, large proportions of both the new and old inhabitants require and are getting extra rations of gasoline.

Stocks of Finished and Unfinished Gasoline

(At refineries, at bulk terminals, in transit, and in pipe lines, as reported by American Petroleum Institute)

THOUSANDS OF BARRELS

REFINING DISTRICT	Mar. 15, 1941 Total	Mar. 14, 1942 Total	*Mar. 17, 1943 Total	March 18, 1944			March 17, 1945			Change of Present Stocks	
				Military and Other	Civilian Grade	Total	Military and Other	Civilian Grade	Total	From 1941	From 1944
Appalachian	3,220	3,914	2,778	.....	.....	3,280	1,917	2,111	4,028	+ 808	+ 748
Appalachian District 1	.....	.....	.....	.....	.....	2,012	1,309	1,209	2,518	.....	+ 506
Appalachian District 2	.....	.....	.....	.....	.....	1,268	608	902	1,510	.....	+ 242
Indiana, Illinois and Kentucky	19,353	23,058	20,495	.....	.....	20,956	6,864	17,139	24,003	+ 4,650	+ 3,947
Oklahoma, Kansas and Missouri	8,790	10,492	7,364	.....	.....	8,187	1,760	7,868	9,628	+ 838	+ 1,441
Rocky Mountain	1,678	2,513	2,086	.....	.....	2,177	496	2,023	2,519	+ 841	+ 342
Rocky Mountain District 3	.....	.....	.....	.....	.....	77	20	64	84	.....	+ 7
Rocky Mountain District 4	.....	.....	.....	.....	.....	2,100	476	1,959	2,435	.....	+ 335
California	16,522	17,425	20,750	.....	.....	15,405	12,272	4,738	17,010	+ 488	+ 1,605
Combined Districts: East Coast, Inland Tex., Tex. Gulf Coast, La. Gulf Coast, North La.-Ark	42,416	49,827	39,899	.....	.....	37,080	22,162	19,532	41,694	— 722	+ 4,614
East Coast	20,638	18,043	.....	.....	.....	.....	6,290	7,470	13,760	— 6,878	.....
Inland Texas	2,452	3,835	.....	.....	.....	.....	1,230	1,904	3,134	+ 682	.....
Texas Gulf Coast	15,353	21,934	.....	.....	.....	.....	11,098	5,476	16,574	+ 1,221	.....
Louisiana Gulf Coast	3,425	4,728	.....	.....	.....	.....	2,599	2,463	5,062	+ 1,637	.....
North Louisiana-Arkansas	548	1,287	.....	.....	.....	.....	945	2,219	3,164	+ 2,616	.....
Total United States	91,979	107,229	93,372	†33,894	†50,794	86,185	45,471	53,411	98,882	+ 6,903	+ 12,697

* Based on difference between figures for March 13 and March 20, 1943. † Based on Bureau of Mines.

Texas Unable to Prohibit Exportation of Natural Gas

Decisions of court indicate that state can pass needed regulatory measures as long as interstate commerce not involved. Taxation declared not the answer to problem

By MARSHALL NEWCOMB, General Counsel, Lone Star Gas Company

Texas cannot legally prohibit the sale or transportation of natural gas in interstate commerce nor directly regulate or tax it.

It is plainly not permissible for Texas to deal with its natural gas on the suppostion that its sale, transportation and consumption can be confined to Texas. Under our National Constitution, commerce between the states can be neither prohibited nor regulated nor directly taxed by the states. It must never be forgotten that, governmentally and economically speaking, Texas is a part of an indissoluble nation. The welfare of the nation as a whole is paramount to the economic interests or grandeur of any particular segment thereof.

Lone Star's Position

The exportation of natural gas from Texas is of little direct concern to Lone Star Gas Company in the conduct of its business, because it imports a great deal more gas than it exports. It is not affiliated directly or indirectly with any other concern engaged in the natural gas pipe line business. It is a Texas corporation engaged in the natural gas and petroleum business almost wholly in Texas, vitally interested in the conservation of gas. It took a leading part in the movement to stop the enormous waste in the Panhandle, and has always operated so as not only to conserve gas but to make available to producers within reasonable radius of its system a pipe line market. For many years it has purchased the larger portion of the gas which it transports and distributes. Thus, its only interest is to make available to the appropriate government agents and to the public such facts and arguments as may permit an intelligent and fair handling of the subject.

No State Barriers

One of the principles of the Constitutional Convention was to obtain and promote unobstructed commerce among the states.

Our sister state of Oklahoma in 1907 enacted a law which prohibited the granting of a charter to, or the exercise of the right of eminent domain, or the right to use the highways of the state by any corporation engaging in the transportation of natural gas unless such corporation should agree that it would not deliver natural gas to those furnishing such gas to points outside the state.

Kansas Gas Company was engaged in purchasing gas in Oklahoma and transporting it by pipe line to points in Kansas. Others were similarly engaged. Upon suit to enjoin enforcement of the act, the court was required to decide whether Oklahoma could prohibit the exportation of gas. Oklahoma complained that it needed all of its gas for its own citizens; and painted a dismal picture for itself if exportation of natural gas in great quantities were permitted to continue.

The Supreme Court of the United States, in *Oklahoma v. Kansas Natural Gas Co.*, 221 U .S. 229, 250, denied that the state had any power under the Constitution to place an embargo upon its products. It is of interest to note that the concern evidenced by Oklahoma has proved unwarranted. Natural gas is now being supplied in abundant quantities and is also being exported to Texas, Kansas, and other points.

In 1919 West Virginia enacted a statute which taxed the transportation of natural gas and oil by pipe lines. The Supreme Court of the United States declared it invalid as to both oil and gas transported in interstate commerce. *Eureka Pipe Line Co. v. Hallanan*, 257 U. S. 265, 266, and *United Fuel Gas Co. v. Hallanan*, 257 U. S. 277, saying that a state tax to be valid "must not in its *practical* effect and operation burden interstate commerce." (Id. 272.)

Act Held Invalid

In the natural gas case (257 U. S. 277) the plaintiff corporation in one year obtained approximately 54 billion cubic feet of gas in West Virginia, most of which was transported and consumed outside the state. Because the challenged tax statute was levied directly upon oil and natural gas which were transported in interstate commerce, it was held to be invalid.

Again in 1919 West Virginia enacted a statute intended, through regulation of pipe line companies, to compel the retention within the state of all natural gas required for local needs. The effect of the statute would work a large curtailment of the volume of gas going into Ohio and Pennsylvania and, in a few years would work a practical cessation of the interstate stream. Ohio and Pennsylvania brought suit to enjoin enforcement of the statute. *Pennsylvania v. West Virginia*, 262 U. S. 553.

Each suit presented the direct issue between two states as to whether one might withdraw a natural product from an established current of commerce moving into the territory of the other (Id. p. 591).

The court ruled that the challenged statute was invalid. It rested its decision upon the commerce clause and, in the course of its opinion, said: " . . . a state law . . . which . . . obstructs or burdens such transmission is a regulation of interstate commerce,—a prohibited interference."

The court considered and overruled the contention that the supply was waning and no longer sufficient to supply local needs and be used abroad; thus ruling that the act was not a legitimate measure of conservation in the interest of the people of the state.

Since the above-referred to decisions, the Congress of the United States has enacted the natural gas act (15 U. S. C. A. 717), and declared that the business of transporting and selling natural gas for ultimate distribution to the public is affected with the public interests, and that federal regulation in matters relating to the transportation of natural gas and the sale thereof in interstate and foreign commerce is necessary in the public interest.

Regulation Only Within State

Texas may adopt and enforce all needed regulations for the conservation of natural gas so long as such regulations apply to intrastate transactions and before interstate commerce begins.

It has been held that a state may forbid the shipment in interstate or intrastate commerce of oil produced in violation of proration orders. *Atlas Pipe Line Co. v. Sterling* (E. D., Tex. 1933), 4 F. Supp. 441; *Hercules Oil Co. v. Thompson et al* (W. D., Texas, 1935), 10 F. Supp. 988. Such regulations are not regulations of interstate commerce because they apply to production and before commerce has commenced. The diminution of the volume of exports in the one case and of imports in the other is incidental and indirect. In *Champlin Refining Company* (286 U. S. 210), the court pointed out that the challenged regulations apply only to production and not to sales or transportation of crude oil or its products. Such production is not a part of interstate commerce even though the product obtained is immediately shipped in such commerce. Such regulations must not take the property of one and give it to another or impair, under the guise of regulation, either the rights of property protected by the Fourteenth Amendment (*Thompson v. Consolidated Gas Utilities Corp.*, 300 U. S. 55), or the right to engage in interstate commerce.

The exportation of natural gas can

neither be prevented nor discouraged by taxation.

Any valid tax upon natural gas which ultimately moves in interstate commerce must be levied upon the production, that is, before the gas is sold in or commences its journey in interstate commerce, and it must be nondiscriminatory in its operation. *Hope Natural Gas Co. v. Hall*, 274 U. S. 284, 286; *Parker v. Brown*, 317 U. S. 341, 360, 361. Those who produce, transport and sell natural gas in Texas already pay a production tax, a gross receipts tax to the state, heavy franchise taxes to the state and gross receipts and street rental taxes to the cities and towns. All of these taxes are in addition to the usual ad valorem taxes levied by state, county, cities, school districts, levee districts, road districts and water districts. To unduly tax natural gas is in effect to destroy the wealth therein because to unduly tax it would be to discourage and retard its utilization. To unduly tax natural gas supplied to Texas consumers will not encourage, but discourage, the location of industrial enterprises.

Economic Consideration

The natural gas resources of Texas are vast and perhaps greater than those of any other state. Natural gas, like anything else, is wealth only in so far as it may be utilized. Texas once thought that the way to realize the latent value of its gas resources was to encourage its use in the manufacture of casinghead gasoline and carbon black, and by exportation to interstate markets. It sought to make available to its producers the interstate markets for their gas (*Thompson v. Consolidated Gas Utilities, Corp., supra*), the only large markets available. There can be no doubt that the interstate markets for Texas gas were to a high degree responsible for the development and conservation of the natural gas resources and wealth of this state, as witness the great development in the Panhandle field after the entrance of interstate pipe lines. But, after these resources have been developed and value made apparent, we should like to retain them to the exclusion of our sister states and their citizens. This, we cannot legally do.

Texas Uses Oklahoma Gas

From 1918 to 1924 a very large percentage of the natural gas supplied by Lone Star Gas Company to Dallas and Fort Worth and intervening areas in Texas came from the State of Oklahoma. El Paso is wholly dependent upon natural gas from New Mexico. For many years United Gas Pipe Line Company has transported gas from Louisiana into Texas.

Shall Texas now say to Oklahoma, or New Mexico or Louisiana, you shall not have Texas gas? This but illustrates the fallacy which the Supreme Court of the United States has repeatedly denounced, that it may husband its own valuable resources while depending upon other states to supply the resources which it does not possess. If Texas refuses to share its natural gas with the citizens of other states, may the latter not retaliate by refusing to use or to consume other products which Texas of necessity must sell to those same citizens? Such a procedure is not only illegal, but it is an unthinkable attitude as applied to citizens of the same nation.

It has been said that Texas gas should be retained by Texas in order to promote industrial development. Texas for many years has had an abundant supply of cheap gas and yet has experienced no great industrial development because of that fact alone. Fuel is not the primary consideration, representing but a small percentage of the total cost of manufacture and distribution. In most cases it does not exceed more than 5 percent of such costs. Some other prime factors which influence the location of industries are: The attitude of the state government toward business as evidenced by its regulatory and tax laws; the availability of labor; transportation facilities, location with reference to markets. So long as industry can obtain fuels, it is hardly likely that they will locate in Texas—so remote from their markets and their present investments, because they can obtain gas as fuel only in Texas. They can by law obtain Texas gas in their present locations. Texas can and has attracted industry because of its sensible attitude in matters of regulation and taxation and because it has developed a spirit of free trade in all of its products.

Treat Natural Gas and Oil Alike

Oil and natural gas are both exhaustible resources. As of December 31, 1943, estimated oil reserves in Texas amounted to 11,545,727,000 barrels, equivalent (at 6 thousand cubic feet per barrels in heat value) to approximately 70 trillion cubic feet of gas. Texas' annual production in 1943 was approximately 592,884,000 barrels. At this rate the reserve would last 19½ years. Known recoverable gas reserves in Texas approximated 80 trillion cubic feet as of December 31, 1943. In 1943 production amounted to 1,294,330,117,000 cubic feet (this does not include gas furnished to carbon black plants and wasted.) At this rate reserves are sufficient for 61.7 years.

So far as the public interest and the welfare of the state are concerned, one cannot successfully contend that natural gas is more valuable than oil. The public policy, as evidenced by the conservation statutes and their administration, has been to permit the waste of gas to further the production of oil. Billions of cubic feet of gas have been wasted that oil might be recovered. But we do not plan to restrict the exportation of oil. We do not even plan to stop the production of oil when to produce it will cause a waste of gas, even though it is apparent that the oil reserves of this state will be depleted much sooner than the gas reserves.

We have read a great deal of the newly developed chemical processes employed for the manufacture of gasoline, acetylene, plastics and other chemicals from natural gas. Most, if not all of the products which may be manufactured from natural gas may also be manufactured from crude petroleum.

Competitive Fuels

Natural gas is competitive with oil, coal and electricity. To curtail or discourage its use as fuel would be to destroy its value.

Texas has demonstrated its ability to deal with the subject of conservation and the wisdom of permitting it to do so. Our conservation laws were grounded on the principle that the highest use of natural gas is for fuel. According to eminent authority, uses for purposes other than fuel will, for at least many years, require small quantities of gas. ("Chemical Uses of Natural Gas," by Benjamin Miller, September 22, 1944.)

If the people of Texas are to realize the full value of the natural gas they own, and if the state is to realize the utmost in revenues utilization of gas for fuel must be encouraged and not discouraged. The discovery of the present natural gas resources of this state would have been delayed for many, many years, perhaps forever, if the value as a fuel had not been recognized and encouraged.

To exclude from the markets, either intrastate or interstate, the use of natural gas as fuel would be to prefer the competing fuels and thus to displace the use of natural gas.

Texas has gone on record as opposing federal regulation of the end uses of natural gas. Federal Power Commission opinion, November 21, 1944, in the *Memphis Natural Gas Company* case states the position of Texas as follows:

> "In sharp contrast to the position of Louisiana, the Texas Commission desires that no federal restrictions whatever be imposed on the exportation of natural gas from Texas. Counsel for the Texas Commission stated:
>
> "'We are great marketers of natural gas in Texas, and we feel that the better the market, the larger the market, the better the price, and the better the price, the easier it is to prevent physical waste of natural gas, because then you have landowners and everyone else undertaking to prevent waste and hold it down."

Oil and Gas

This position is sound. It must be grounded, at least in part, on the proposition that to exclude natural gas as fuel from the citizens of certain states or areas will be to deny to the citizens of Texas a market for their product.

The federal government has created great hydro-electric power projects and cheap federal power will ultimately be available to every region. If Texas discourages the utilization of its natural gas as fuel, electricity ultimately will displace natural gas as fuel for power and heat.

Presently known coal deposits of this nation will last some two thousand years. If this be so, one may expect that coal will not only hold its own in the competitive fuel markets but will actually advance its position.

Oil is utilized throughout the nation as fuel for domestic and industrial purposes, even in areas where dependable natural gas is available.

Uses for electricity and the more advanced means for using coal will undoubtedly make inroads upon some of the purposes for which natural gas is now used. To hoard the natural gas wealth of this state beyond that expectation would, in the opinion of many, be very foolish.

Texas must do all things needed to prevent the waste of natural gas and oil, but while doing this it must also encourage the widest possible market and use for them. In this way—and in this way only—will it realize the full value of these important resources.

Gas Well Ownership Is Clarified in Texas Bill

Representative Joe Harris of Houston has introduced House Bill 739 which provides that no producer of gas is to be classified as a public utility and subject to utility tax payments unless he is also engaged in owning, operating or managing a pipe line for the transportation of gas for domestic use or sale to the public, or to a municipality.

Technically the owner of a producing gas well is a public utility and subject to utility tax charges. Few instances have arisen where the taxes were collected under these circumstances, but if the new bill is enacted, it should correct this situation.

How to Judge Geophysical Methods

Three of suggested criteria easy to apply but two require patience, skill and "clairvoyance"

By W. M. RUST, JR.*
President, Society of Exploration Geophysicists

LAST March when you did me the honor of selecting me as president, I hoped I would have the privilege in my presidential address of telling part of the story of the contributions of geophysicists to the war effort, and of attempting some prophecies concerning the contributions of the war to geophysicists' future prospecting efforts. For a time last fall, official optimism reached the point where it seemed that it would be possible to secure the release of some of the story; however, in December, I realized that someone else would have that pleasure. But, in looking forward to the day when we can turn away from our wartime activities, I have had my interest rekindled in an old problem—that of evaluating proposed new geophysical prospecting procedures and the somewhat simpler but still extremely difficult problem of evaluating modifications of existing methods.

We all remember the anguished cry that only new discovery methods could stop the distressing decline of discovery rate. Yet we know what happened when the problem of inadequate discoveries was made more acute by an unprecedented increase in production to oil the war. The number of seismograph crews reached an all-time high. The number of gravity crews reached an all-time high. But where were the crews using new or unconventional methods? You know the answer. Wisely or foolishly, we were afraid to use them when the heat was on.

Dreams Dammed Up

I wish that my title, "Evaluation of New Geophysical Methods," actually meant that I was offering an evaluation of a number of new geophysical methods. Unfortunately, there is a dearth of proposed methods, sound or unsound. The causes of this scarcity are well known and will end with the war. The unparalleled demand for technical men in the development, and use of instruments of warfare, has not only drawn the time and thought of nearly all of our research men and many of our operating men but has also turned the attention of free lance inventors, as well as crackpots away from the ever-alluring problem of getting rich quick by discovering the answer to the problem of find oil. The problems of war have the obvious appeal of patriotism and the stimulus of new and exciting approaches, as typified by radar.

But the war has not dried up the stream of oil finders' dreams; it has only dammed it up. War has emphasized the vital role petroleum plays in modern life. More than half of the tonnage of war material shipped overseas is petroleum products. Moreover, the pinch of gasoline and fuel oil rationing in this country has brought the problem home in a very direct and personal way. It is widely known that our oil-finding effort is not too satisfactory. Even before the war, our consumption of petroleum was outstripping discoveries at an alarming and rapidly increasing rate. The enormously increased demand for oil brought on by the war obviously made the problem even more serious.

It is certain that rewards, promised the fortunate inventor, coupled with the availability of wartime technological miracles, such as radar and other still-unmentionable developments, will result in a stream of proposals of new geophysical methods and modifications of old methods. Radar may well replace the witch-hazel fork. When this flood comes, from our own men and from outsiders, we will be faced with a two-fold problem of extraordinary difficulty. First, we must recognize and adopt any proposal of real merit. Second, we must condemn, with the least possible expenditure of money and effort, all proposals which have no real merit.

Statement of Criteria

Here is a second confession. Not only have I no new methods to evaluate for you today, I also have no sure and simple system of evaluation to propound. I hope, however, that it may prove helpful to discuss a few phases of the problem. Let me first state five criteria which a usable geophysical prospecting method must satisfy. Any method which fails to satisfy these criteria, properly interpreted, is of no value. At first sight, these criteria may seem so obvious that discussion is unwarranted. Perhaps. But the first three are fairly simple to apply and will dispose of a high percentage of crackpots. The last two, which are intimately related, are the ones which require skill, patience and a touch of clairvoyance, to apply with certainty.

First, the method must involve physical measurements of some property of the earth. The term "physical" is used here to distinguish from "psychical" and include chemical, biological and so on.

Second, the measurements must give reproducible results. The term reproducible will require some explanation.

Third, the process must be able to compute, on the basis of economics, with existing methods. This involves both the cost of operations and the value of the results.

Fourth, and this is almost a restatement of our problem—the method must have a significant relation to the occurrence of oil.

Fifth, the method must have a teachable interpretation.

Discussion of Individual Criteria

A consideration of the individual criteria will show them less obvious than appears. The first, that the method be based on physical measurements of some property of the earth, should be extended to require that the physical property involved be idtentifiable. This would exclude the wiggle-sticks and unique instruments, which, for reasons unknown to the discoverers, give certain reactions when directly over oil or gas. Even if some Yogi has physical powers that enable him to locate oil or if by some queer and unknown chain of events, a watch decides to stop whenever the owner crosses a pool of oil, these remain isolated phenomena and unless the laws that goven them can be determined and, in the first case, our seismograph computers taught Yogiism, and, in the second, our instrument makers taught to duplicate the watch, neither can form the basis of a new geophysical method. We may be willing to waive the requirement that the physical property be identifiable and insist only that a definite series of manipulations leading to a numerical result be followed. We twist the knobs on a little black box according to definite rules and read a scale. If convinced that the resulting scale reading is actually a function of the location where the measurements are made and satisfies my second criteria, one may begrudgingly admit that it is a physical measurement of some as yet unidentified property of the earth, but until a name is invented for the property and there are discovered some of the laws it obeys, the scientist will remain unsatisfied and suspicious.

Suppose now we have a device which gives a physical measurement in this sense. It is of no value unless the elementary data which it gives can be repeated with a sufficiently high degree of accuracy or unless repeatable secondary values can be obtained from these primary data by straightforward computations calling for a minimum of personal judgment. An example of the latter type is a magnetometer survey where corrections must be made for diurnal variation. This criterion is not too simple to apply. If enough significant figures are retained, repeated readings will always differ. We must, therefore, decide what we mean by a sufficiently high degree of accuracy of repeated measurements. Not only must the measurement at individual stations be reproducible but the anomolies obtained in an area by occupying two different but overlapping sets of stations should practicaly coincide. The variations observed over an area containing an anomoly interpreted as indicating an oil field, should be much greater than the variations observed when the same number of stations are crowded into any small portion of the area. A method which is basically sound may fail to meet this criterion in the course of any one trial because of instrumental difficulties. This is a problem for the developer of the method, not the evaluator. Until such difficulties are largely overcome or

* Presidental address delivered at Society's meeting in Tulsa, Oklahoma, April 4, 1945.

readily identifiable, the process should not be called a geophysical prospecting method.

Principle Requirement

With satisfactory cooperation from the advocates of the method, these two criteria can be applied with reasonable assurance that fairly definite answers to them will be obtained without an excessive expenditure of time, money or effort. The principal requirement, other than careful, conscientious work, is that a sufficiently large region be covered to give both normal and anomolous areas. A method which fails to satisfy these two criteria certainly cannot be used as a practical prospecting method; at best, it may serve as the basis for further research. On the other hand, some methods which satisfy these criteria are not useful prospecting methods. As a concrete example, there can be mentioned measuring the distance to the nearest hard-surfaced road. Incidentally, it might surprise you how well this method succeeds in finding oil fields.

Before we turn to the difficulties and somewhat speculative fourth and fifth criteria, let us look at the reasonably simple third criterion—the method must be economically competitive with existing methods. This may be true if it finds oil not found by other methods, even though it may fail to find some oil they can find. It is not necessary to make all existing methods obsolete to deserve acceptance. Each individual case must be considered on its own merits. We can, however, determine some general limits. The cost per acre certainly must be less than the cost of drilling wells to the maximum effective depth of the method and closely enough spaced so that no commercial deposit of oil or gas could be missed. It seems safe to assume that no geophysical method will give more direct and valuable data than a properly drilled wildcat. At the other extreme, a new method cannot compete with one of the established methods which gives equivalent information at a comparable cost per acre. Within these wide limits, the cost and value of the method must be weighed against one another and against those of other methods by intelligent guessing. Frequently the answer will be obvious after a moderate amount of study.

"Significantly Related"

The fourth criterion, that the method must give information significantly related to the occurrences of oil will in most interesting cases be difficult to apply. A method gives information "significantly related" to the occurrence of oil, if the information is successful in finding oil, when used to guide a program of leasing and drilling with the same intelligence and confidence that the information from reflection seismograph work is now used.

Two approaches to the application of this criterion are useful. The first is the theoretical. If the theory of the method is well developed and if numerical data on the variation of the relevant physical properties on and off of anomolies are available, it is possible to give a mathematical "Yes" or "No," if the calculations can be carried out without the necessity of introducing approximations which vitiate the conclusions. Three substantial "If's"! No refinement of surface gravity methods will permit one to determine the presence or absence of oil in the subsurface. Likewise, it is possible to say that radar methods, depending on the transmission of ultra-high-frequency electromagnetic waves through thousands of feet of soil will not find oil in place. There is, however, a serious danger in theoretical studies of reaching the wrong conclusion by starting from false assumptions. Everyone knows the classic story of the major company that refused to use the reflection seismograph for five years after its introduction because an internationally known physicist proved mathematically that the method was unsound. However, such a study is very useful by suggesting possible strong and weak points of the method. Whenever possible, it should be part of the evaluation program.

The second approach is the empirical and statistical. A thorough empirical study is a long and costly process. Because of the nature of the technical problems involved, the direct responsibility should be borne by a geophysicist, but because geological data, and often information on future drilling programs, are needed, the geologists are closely involved. Likewise, because the program may well involve very substantial expenditures before a final decision is reached, confident support from management is essential.

Test Areas Important

One of the first and most important steps in an empirical evaluation is the selection of actual areas to be studied. It is frequently necessary to select a number of different areas for study before condemning a method. Suppose the first tests of the reflection seismograph had been in certain parts of West Texas. Or, suppose the early refraction and gravitational work had not been in salt-dome country. A number of systems for selecting the trial areas has been suggested. A popular and useful system is to select areas where rather comprehensive data, from other geophysical methods and from wells are already available. In this system the results of the proposed method can be compared with those of other methods very quickly. There are, however, some objections. For example, the physical nature of an oil field is changed in many respects during the development process. This may well result in anomolies on oil fields which were not there before the development. Or, it may obscure a legitimate anomoly which could readily have been found before development. Nor is this all. The interpreter is apt to be influenced by his knowledge that an oil field is there. If not, one who examines his work will be inclined to discount the anomolies which occur on oil fields. Thus, both physical and psychological factors conspire to detract from the value of the areas which are occupied by oil fields. The same thing is true, to a lesser extent, of dry holes. Even if there are no oil fields or dry holes, there is some fear that the results, if judgment is involved, may be colored by the information already in hand. If an area is selected where little drilling has been done, but where the geophysical data are considered good, useful results are obtained where the new and old data agree; but when they disagree, one is in a dilemma. If the old method is assumed to be perfect, there is little point in trying the new method. But if it is admitted that the old method is fallible, nothing is added to our knowledge of the new method. This system, however, is particularly useful in studying methods for which very specific claims have been made. A method which is supposed to locate the edge of production by measurements along a single profile may be quickly disposed of in the woods on the edge of any oil field. Or, on electrical method which is said to be insensitive to shallow variations may readily be checked by a line across a known shallow anomoly. Such spot tests weed out some unsound methods but do not prove the soundness of the methods which they fail to condemn. In using spot tests, one runs the risk of condemning a useful method because its promoter was overenthusiastic.

Another system is to work fairly large areas around locations of wildcat wells to be drilled in the near future. This avoids most of the difficulties of the preceding system. It requires much more time and is therefore feasible only for very promising methods. It may be argued that this system gives some advantage to the method under investigation since wildcats are presumably drilled only in areas which seem favorable. This difficulty can be minimized by working a large enough area around each wildcat.

A third system, on a purely technical basis the most desirable but which is very expensive if the method is unsound, is to select a number of large areas, prospect them with the proposed method and then drill the anomolies. This gives a direct answer as far as each area is concerned. A disadvantage is that if the method fails in the first area tried, it is likely to be condemned, though it might well have succeeded in the next.

One Out of Five

Whatever procedure is used in empirical evaluation, there is a grave danger of demanding an unnecessary degree of perfection. Because of the limitations of present methods, a new method could prove very useful and yet have a fairly high ratio of failures. According to Lahee, of 596 wildcats drilled primarily on seismograph data in 1943, only 123 were producers. Thus, a new method, which gave one discovery out of each five wildcats, might be a serious competitor of the seismograph. This contrasts rather strongly with the scale we are likely to use in evaluating a new method empirically. Depending upon such factors as the "reasonableness" of the method and our personal hunches, we are apt to demand that the method find 75 to 100 percent of known prospects in an area and that from 50 to 100 percent of the prospects it finds, on which we have other information, should be either oil fields or suitable traps. On the other hand, if we lower our standards to a more reasonable ratio of successes we run into trouble with coincidences and the possibility of those secondary factors which result from the development of oil fields, such as my earlier example of hard-surfaced roads.

By the fifth criterion, the method must have a teachable interpretation. This simply means that it must be possible for a trained interpreter to derive from the primary data, given by the method, information which is usable in the search for oil and that the process used in deriving this information must be one which may require intelligence, experience and judgment but not guesses or arbitrary choices. Two skilled inter-

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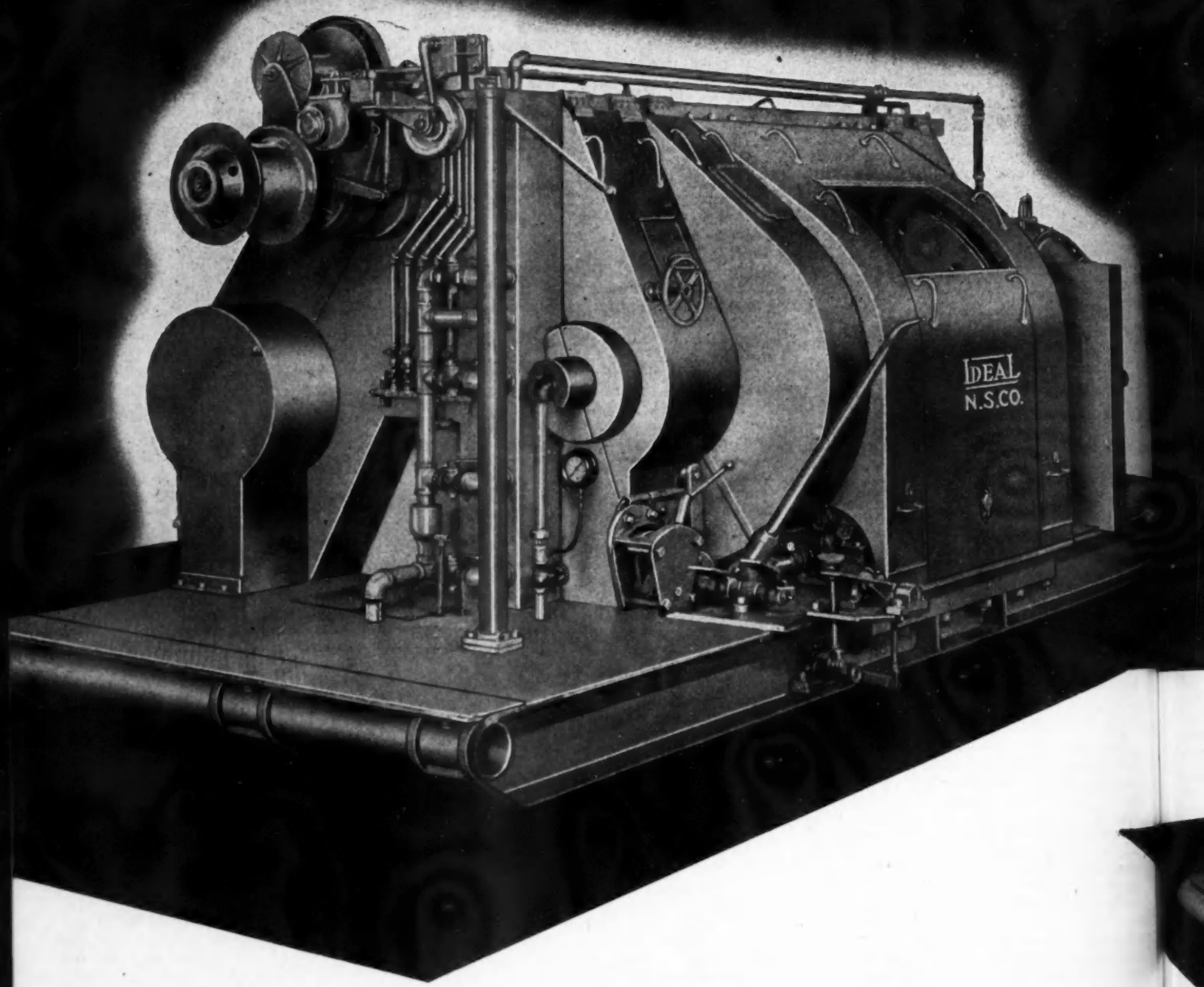

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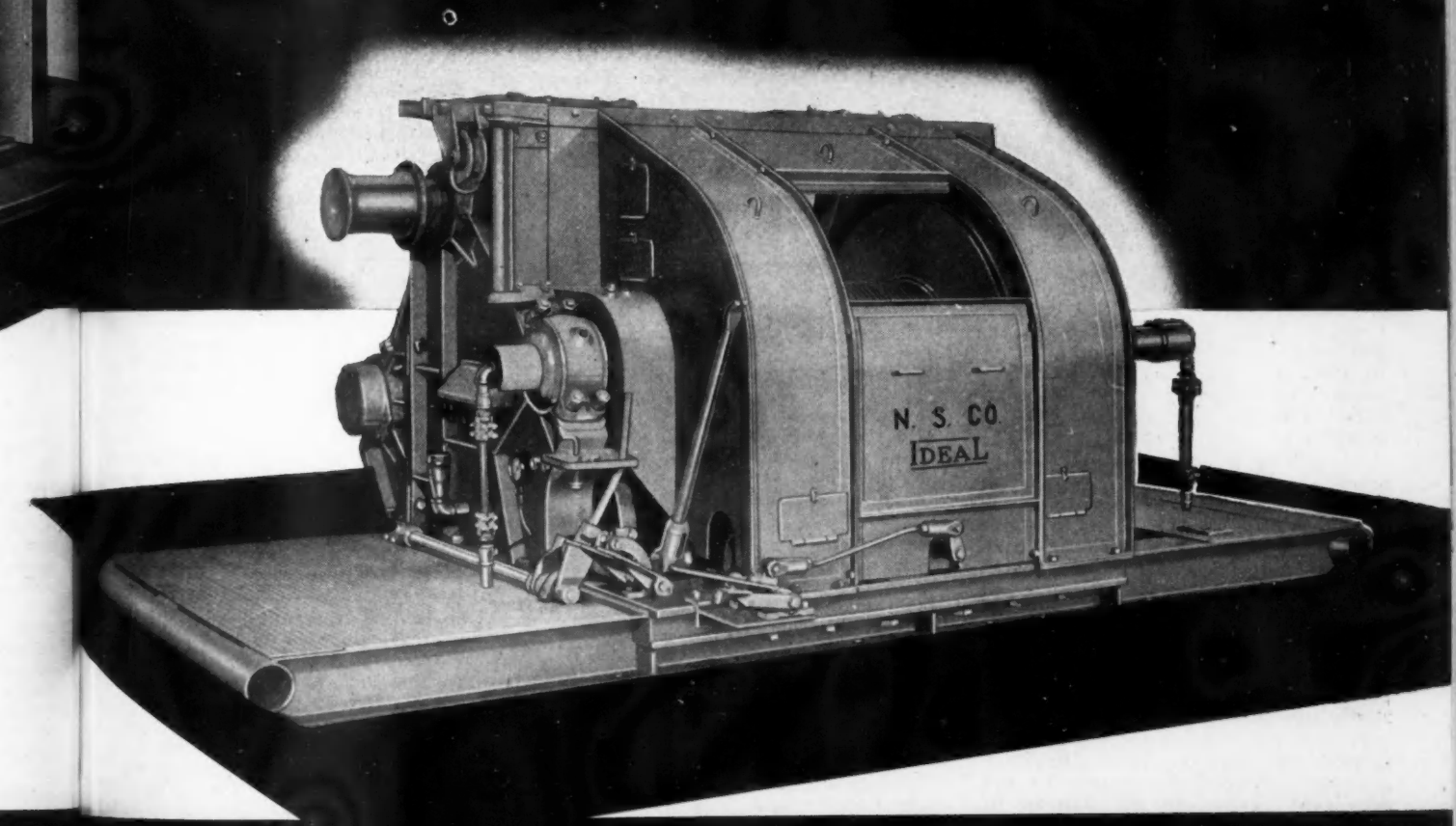

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Brazil's Oil

Intensive Exploration Needed to Solve Nation's Problem

By VICTOR OPPENHEIM, Consulting Geologist, Lima, Peru

IT MAY appear unusual that Brazil, with a territory of 8,500,000 square kilometers, or about three sevenths of the South American continent, has as yet no commercial oil production within its borders. Although there may be several reasons of an accidental and technical order for this, the main reason is purely geological and independent of questions related to the technical organization.

In the present world petroleum situation, when oil reserves become more important, and the search for productive oil lands more acute, undoubtedly new fields in Brazil would be very welcome. Besides relieving the Allies of the strain of supplying Brazil with oil from the North, local production in Brazil would ease considerably the transportation difficulties at a time when all efforts are concentrated on war problems.

Time to Start

It is doubtful whether Brazil will ever solve her petroleum problem during the present war; nevertheless, she should attempt a solution now, even though it may not be definitely achieved. The solution depends to a great extent on the amount of modern scientific investigation applied to the search for oil in Brazil. Until the present very little of modern technique has been used by Conselho Nacional do Petroleo, and the Bureau of Mines which preceded it until 1937. Now, as then, the total consumption of Brazil, of about 10 million barrels per year, is imported into that country.

The policy of strict control over all activities related to oil may not be the exact solution of the Brazilian oil problem and may even have an opposite effect. A policy where petroleum companies sould collaborate in the search for oil, applying their considerable experience, both geological and technical, might eventually give much better results to Brazil, multiplying the field of investigations based on modern and proven methods and backed by a substantial incentive to find commercial oil.

For more than three years, from 1933 to 1936, the writer served the Brazilian government as consulting geologist and petroleum adviser to the Bureau of Mines. Visiting Brazil ten years later he had both the satisfaction to see that most of his estimates were still in force and also the regret that nothing radical had been undertaken since 1934 to expand and modernize the geological field investigations, as repeatedly suggested by the writer some ten years ago.

No Detailed Study

Petroleum geology in Brazil still consists in reports covering the descriptions of rocks of a general interest, based on suggestions and assumptions. Apparently no attempts have as yet been made, except possibly in Bahia, to undertake more up-to-date detailed geological investigations, accompanied by proper geophysical studies and test borings. These, however, should be entrusted to highly specialized and efficient workers, as the problems to be faced are far from having an easy solution.

When acting as consulting geologist to the Brazilian government the writer was familiar with, and expressed his opinions on, many areas where oil could be expected in Brazil. The areas concerned are still the same and are:

1. The Parana basin in southern Brazil.

2. The coastal belt including Bahia and Alagoas.

3. The lower Amazon basin.

4. The upper Amazon and the Acre territory.

Although each of these prospective regions is of a considerable extent, their geology is rather uniform. The greatest part of Brazil consists of old shield rocks with super-imposed mostly flat-lying or metamorphosed sediments of early Paleozoic to Mesozoic ages.

The four prospective areas are thus the only ones where oil shales or indications of oil and gas have been known to occur. A brief outline of each of these areas from the viewpoint of petroleum geology may give a better understanding of the petroleum situation there. More detailed data can be found in the bibliographic references.

The Parana Basin

The Parana basin is a great syncline covering an immense territory west of the Brazilian Shield, and as far west as the Paraguay river. It can also be considered as the eastern extension of the great Chaco depression. Geologically, the basin consists of Permo-Triassic sediments and disbase traps known as Gondwana rocks. These formations cover the greatest part of the states of Sao Paulo, Parana, Santa Catarina and Rio Grande do Sul in Brazil, and extend southwest into Uruguay and west into Paraguay. To the west, the Gondwana formations are covered, in isolated areas, by young continential Tertiary beds. Underlying the Permian or Permo-Carboniferous, as it is considered by some, there appear on the edges of the basin isolated areas of Lower Devonian sandstones and shales. Rather complete studies of these main formations of the Parana basin were made by the writer in 1933 to 1936, and appear in the bibliography.

Sedimentary Conditions

As a whole, the sedimentary formations of the Parana basin show conditions of deposition in Mediterranean shallow waters, mostly of continental character, possibly the sediments were intermittently submerged and exposed to conditions of an arid climate. Most widespread rocks of the basin and of southeastern Brazil are the extensive flows of Basalts and Diabases that cover by far the greatest part of the basin. Igneous bodies related to these vast flows in many forms of dikes, sills, etc., traverse the underlying sedimentary formations in every possible direction. Structurally, the Parana basin appears to be fractured and very faulted. The intense faulting could have occurred during the period of magmatic effusion or could have preceded it. It seems evident though that the main tectogenic movements have taken place in post-Triassic times.

From the point of view of petroleum geology, two factors seem to be quite negative:

a. The predominantly continental or shallow water deposition;

b. The structural aspect of the sediments as related to the igneous rocks.

Due to the great number of igneous bodies traversing the sediments, these would have acted as test borings, bringing to the surface whatever oil could have accumulated in the deeper strata. As it is, however, despite the fact that there are numerous known outcrops of highly bituminous Iraty shales, as well as oil impregnations in the Triassic Botucatu sandstones, there is not a single known active oil seep in the whole of Southern Brazil. The oil shows found in the main borings were originated from the Iraty horizon.

However, despite the adverse condi-

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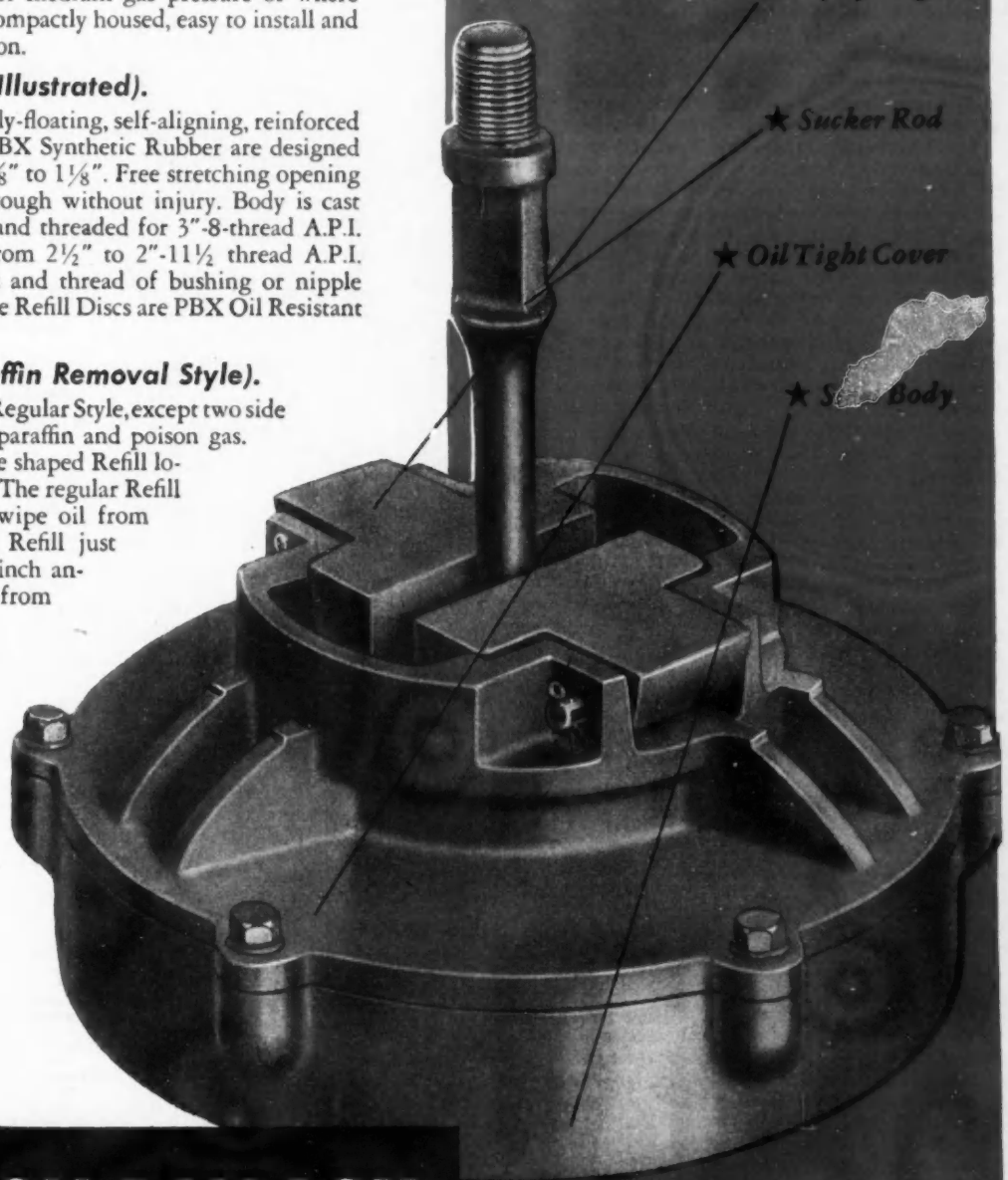

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tions of the basin, from a general petroleum point of view, the writer advised more test borings, but this has not been done.

The Coastal Belt

The long strip of sediments that extends along the Atlantic coast of Brazil from north of Victoria and up to Marañao appears to consist mostly of continental sediments of Tertiary and partly Cretaceous ages. The sedimentary belt is narrow and represents flat-lying strata covering the outermost edge of the Brazilian Shield. In the areas where petroleum indications are known either as seeps or oil shales, the sedimentary cover is much thicker and wider; these are the basins of Bahia and Alagoas. Both areas were drilled for oil and the results of the borings thus far carried out show a fairly clear picture of the general geological conditions.

Bahia Basin: The area of supposed petroleum interest in the Bahia basin is about 60 kilometers long by 10 wide. The sedimentary rocks are Tertiary but the underlying beds are considered to be of Cretaceous age. The basin is locked in by shield rocks except a narrow gap which connects it with the present day ocean. One would expect it to be shallow; however, the latest borings have drilled through more than 8000 feet of sediments without reaching the basement. The Tertiary beds are all continental and the underlying Cretaceous are in part continental, but mostly marine.

Non-commercial oil was found near Bahia in 1939. The occurrence is interesting from many points of view, considering the peculiar type of pockets in which the oil is found which may not be directly controlled by conditions of structural height. The oil is of a paraffinic base, but thick and heavy.

Unfortunately, little, if anything, has been published lately on the geology of the Bahia basin as reflected in the many borings drilled recently. When in Brazil, the writer did not have the opportunity to study the geology of the basin; however, from the whole scope of known data it appears evident that the Bahia oil occurrence must be considered of greater experimental and academic interest than as a commercial oil proposition.

Sixty Wells Drilled

Till the middle of 1944 about 60 wells were drilled by the federal government, directly or through the Bruntley Drilling & Exploration Company. The borings were located in four separate areas extending from the south to the north of the basin and near its faulted edge. Out of these, 16 produce small quantities of a thick paraffinic oil. The actual production of the 16 wells may reach about 400 barrels. This production hardly compensates for the drilling costs and local consumption requirements.

According to the former vice president of the Conselho Nacional do Petroleo, the amount invested in the Bahia oil exploration by the Brazilian government exceeded then 7 million dollars. This, of course, appears incommensurate with the results obtained.

There is a possibility that further geological studies with modern scientific methods may find a real commercial oil field in the Bahia basin. The writer, however, hardly believes in the great future of the Bahia basin and its importance in the solution of the Brazilian oil problem. Possibly, if worked to its maximum capacity, the basin may, at a very high cost, supply the consumption of Bahia proper.

Alagoas Area: Oil shales were known on the coast of Alagoas for a considerable time and many borings have been made by the Brazilian government and private enterprises for the last twenty years. The results, however, have thus far been negative.

The oil shales that form outcrops along the coast are of Tertiary age and, judging by the fish fauna, Eocene. The general geology and structural conditions of the Alagoas area were studied by the writer in 1933 and discussed in a paper published in the AAPG Bulletin of March, 1937. At the time, the writer did not consider the Alagoas shales suited for large oil accumulation, that would warrant commercial production. Several deep borings carried out by the Bruntley Drilling & Exploration Company, particularly at Ponta Verde, have amply confirmed these views. Salt layers and numerous oil shows were, however, found at a depth exceeding by far the hitherto estimated thickness of the Alagoas sediments.

Lower Amazon Basin Borings

Lower Amazon Basin: The Brazilian government has carried out in the past years a number of borings for oil in the lower Amazon basin near the Tapajos River. Several of these were drilled at Monte Alegre and Itaituba; the deepest boring has not surpassed 500 metres and traces of oil and gas were found at 250 to 300 metres level.

The borings were made in Lower Devonian shales and the limestones of the Curua and Maecuru series which form narrow long strips of outcrops along the lower Amazon valley near the Tapajos River. It is presumed, though, that the Amazon Devonian formations, although equivalent in age to Hamilton-Onondaga and Heldenberg-Oriskany of the State of New York, are comparatively thin, hardly exceeding 300 metres. On the whole, little is known of the stratigraphy of the lower Amazon basin. The fragmentary data thus far recorded do not show the real stratigraphical and structural conditions of this vast area.

Upper Amazon Basin and Acre: The geological constitution of the immense territory west of Manaos, and as far as the Brazilian borders with the neighbouring republics to the west is totally obscured by the blanket of Quaternary and young Tertiary sediments of such an extent that without borings or geophysical help it seems quite impossible even to estimate the depth of the basin. The outcrops of basement rocks in the Rio Negro to the north and the Rio Madeira to the south are too wide apart to assume the continuation of the basement at a shallow depth.

Results in Acre

The area suggested by the writer in 1935 as of interest for petroleum exploration, the Tertiary of Acre, has not been studied since then to any serious extent. Some borings were made by the Brazilian government, mostly in unsuited localities and these gave totally negative results.

It is evident, however, that the Andean folding has affected the western edge of the Acre Territory and favorable structures exists in that area, as originally suggested by the writer. (See "Geological Exploration between Upper Jurua River, Brazil, and Middle Ucayali River, Peru." Bulletin of AAPG, January, 1937.)

A considerable amount of field work has still to be carried out even for a general idea of the geology of the Acre Territory. This, of course, applies as well, and much more, to the rest of the upper Amazon basin.

Other Work Indispensable

Preliminary investigations and geological reports on areas as vast as the Amazon are highly valuable; they do not, however, substitute thorough and detailed field work with borings and geophysical methods that are indispensable and will have to be carried out for a final opinion on its petroleum possibilities.

Given the great territory of Brazil, its limited economic means as well as means of communication and the small technical and up-to-date trained personnel in Brazil, many years will elapse before the Brazilian petroleum problem will be solved. One way, however, to reach a solution is to carry out as many field investigations and borings as possible, as much with government means as with the help of foreign oil companies.

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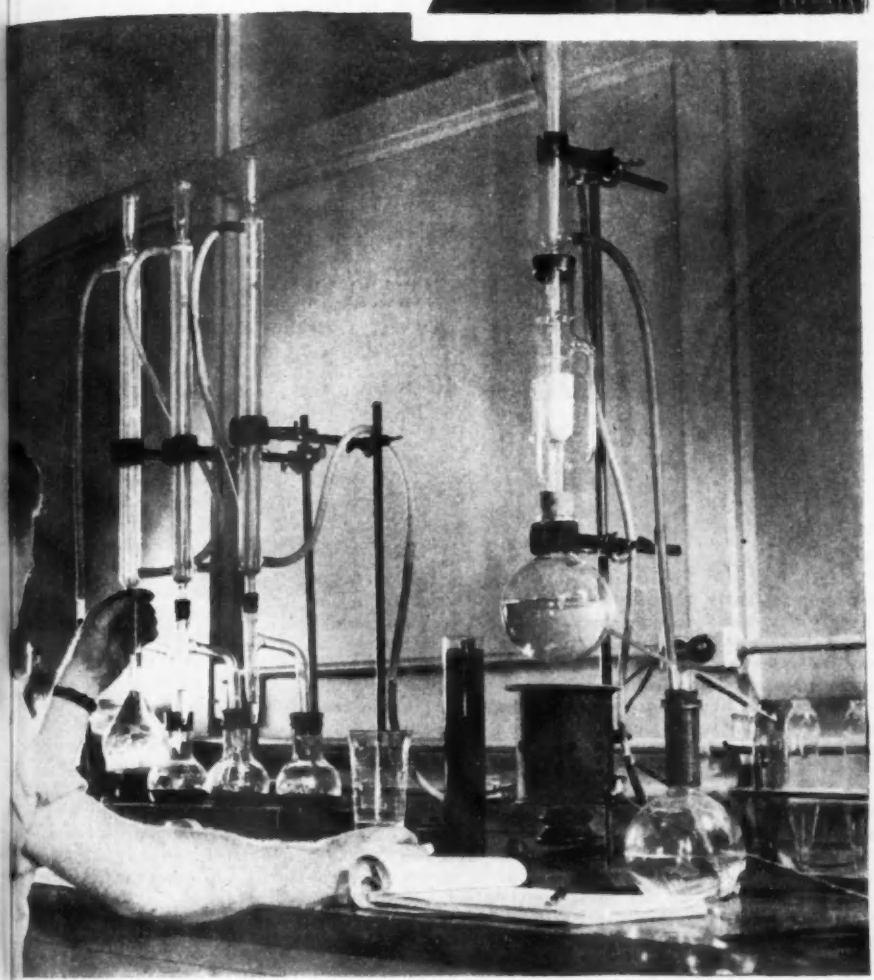

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Reservoir Fluid Flow Research

A THOROUGH STUDY OF FACTUAL DATA ESTABLISHED FROM FUNDAMENTAL LABORATORY FINDINGS

By NORRIS JOHNSTON, General Petroleum Corporation, Los Angeles, and
H. VAN WINGEN, Richfield Oil Corporation, Los Angeles

OF NECESSITY the majority of the work designed to study the flow of fluids in petroleum reservoirs has been conducted in the laboratory. Certain significant information has resulted from a careful study and analysis of actual reservoirs, but because of the many variants which affect the analysis on such a macroscopic scale, these types of studies seldom lead to the establishment of fundamental concepts and are of value primarily, instead, for the purpose of corroborating the fundamental and basic concepts as developed by laboratory studios. In other words, because of the fact that the actual field behavior reflects the composite effect of many variables, the laboratory has to be relied upon to furnish the fundamental theory of the inter-action of the static and dynamic forces as they affect flow, as only in the laboratory the necessary specific control of boundary conditions can be achieved, and the number of variables governed. As a result, the discussion to follow is limited to a consideration of factual data as established from such fundamental laboratory research.

In reviewing the literature it is apparent that, though notable exceptions exist, there is a general tendency for investigators to draw more elaborate conclusions than the fundamental nature of the data would seem to warrant. As a result, certain concepts have taken on the appearance of facts, though their derivation is supported by little more than the extrapolation of an hypothesis. Likewise, in striving for useful and practical results, a tendency has been observed to introduce too many variables, thus leading to results of questionable fundamental value. Offsetting this, certain groups have gone so far in the direction of eliminating all but one unknown, that the system studied bears but little resemblance to the actual petroleum reservoir with which we are concerned. This phase will be discussed in more detail in the section dealing with the recommended future research. As a result of these conditions much concrete knowledge needs yet to be disseminated in order to compile a reasonable fund of knowledge of reservoir fluid flow. In this regard it is to be regretted that much material of great fundamental value is being withheld from industry-wide use due to personnel shortage to prepare it for presentation, and due to competitive secrecy.

The majority of research has dealt with unconsolidated sands and has been conducted without the consideration of a second immiscible liquid phase to simulate interstitial water. Yet, as all normal producing sands contain water, it is to be questioned seriously if results of experimental laboratory work on samples one hundred percent oil saturated can be applied to actual field problems. Likewise, it is to be cautioned that any conclusions based upon experimental work performed with unconsolidated sands do not necessarily apply quantitatively to consolidated sands. Greater care would also seem to be in order in regard to the determination of adequate scale factors in interpreting the results of laboratory analysis in terms of a corresponding behavior of the prototype.

THE purpose of this paper is firstly to review the literature pertaining to the flow of fluids in reservoirs, and secondly to suggest experiments which remain to be performed before a reasonably complete understanding of reservoir behavior may be had. The many recent investigations which have contributed to the knowledge of the mechanism of the flow of fluids in porous media are reviewed with the specific purpose of determining (a) those concepts regarding reservoir fluid flow which can be considered as having been established definitely and which may thus be accepted as being basic and permanent, (b) those conclusions which are not so well proved by the data and which thus might be subject to future revision.

It was not possible to review all the papers published on the subject. Consequently, the group in the attached bibliography was selected as being probably most representative of the concensus of reservoir analysis.

This paper represents the work or report of the California District Topical Committee on Production Technology of the American Petroleum Institute Division of America. It was presented before the Pacific Coast District of the Institute's Production Division at Los Angeles on March 29, 1945.

A. *Concepts Definitely Established*

Bearing the above limitations in mind the following facts have been established in the field of laboratory work designed to study the flow of fluids in petroleum reservoirs:

1. Effective permeability to one of two simultaneously flowing phases varies from 0 to 100 percent of specific permeability as the instantaneous saturation of the sand with that phase varies from 0 to 100 percent. There is no relationship common to all systems.[1,2,3,4,6]

2. In two-phase flow, the effective permeability of the phase which wets the sand grains is reduced sharply by small quantities of the non-wetting phase, dropping rapidly to low values as the saturation by the non-wetting phase increases.[3,4]

3. In two-phase flow, the effective permeability to the phase which does not wet the sand is not appreciably decreased by small quantities of the wetting phase but is rapidly decreased by amounts over about 10-20 percent of the wetting phase. It drops to low values as the saturation by this phase exceeds about 20 percent.[1,2,3,4,6]

4. At a given saturation, the effective permeability to water is independent of the nature of small quantities of the non-wetting phase such as oil or gas in the case of water wet sands (corollary to 3). It is also largely a function of water saturation alone, since air, gas or oil act similarly as non-wetting phases in water wet sand.[4]

5. Relative permeabilities of water wet sand for oil, gas and water are nearly independent of the oil viscosity.[1,2,3,4,6]

6. Water retained in a sand after constant velocity flow of oil, is inversely related to specific sand permeability. This indicates that the degree to which oil displaces water is limited by the size of communicating pores.[2]

7. Systems containing as much as 70 percent interstitial water have been observed to produce clean oil, yet have zero permeability to the water phase.[2,3,6]

8. A threshold pressure is required to force a non-wetting fluid into a sand.[2,5,6,13]

9. Interstitial water remaining in a previously water saturated sand after flow of oil through that sand to equilibrium varies with the pressure gradient or velocity of oil flow. In experiments performed to date a limiting value of the water saturation of approximately 10 percent has been observed.[2,3]

10. Quantity of oil recovered by gas drive per unit of gas increases with decreasing viscosity of oil.[1,4]

11. Quantity of oil recovered by gas or air drive per unit of gas or air de-

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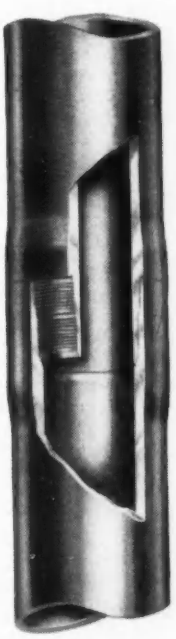

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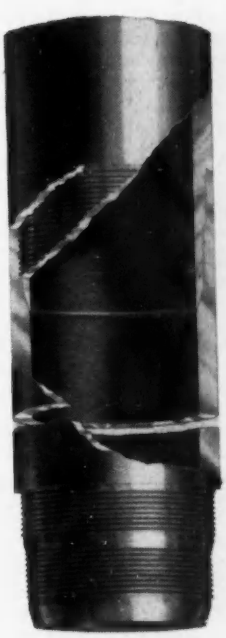

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creases exponentially as oil saturation decreases.[1,4]

12. In the flow of gas-oil mixtures through dry, consolidated sand, there is a threshold pressure differential and gradient as for a single phase flow stream of either oil or gas into a water saturated sand. This threshold pressure varies with composition of the two-phase stream and also the specific permeability of the sand.[5]

13. The threshhold pressure differential and gradient decrease with increasing specific permeability.[5,6]

14. Threshold differential pressure for entry of air into a water wet sand containing oil is not substantially different from that for a dry sand containing oil.[6]

15. Oil and gas flow can not come to equilibrium until a certain minimum gas concentration has been built up in the sand, since no gas can flow without this minimum gas concentration.[16,17]

Saturation Constant

16. Final total liquid saturation upon completion of a gas drive is essentially constant regardless of the amount of water initially present.[18]

17. The amount of oil expelled during pressure reduction of a core containing oil saturated with gas will not be greatly affected by the initial pressure, providing the pressure is sufficient to supply a quantity of gas which will, during depletion, raise the gas saturation to the point (approximately 25 percent) where relative permeability to gas is high. This must be limited to pressures below those at which retrograde condensation will occur.[23,17]

18. Gravitational fluid segregation depends on the rising gas velocity. Gravity drainage commences when the velocity of the gas which is migrating to the gas cap can no longer sustain the oil. This critical velocity below which counter-flow can occur varies with the sand and fluid conditions.[9]

19. In the case of sands not containing interstitial water, the pendular oil, and that in the thinner belt of the funicular region, is irrecoverable by gravity drainage, even though the sand be homogeneous. The pendular region represents the lowest liquid saturation range where the liquid occurs as separate rings around grain contacts. The funicular region represents the intermediate liquid saturation range where the liquid occurs as a series of coalesced rings surrounding the sand grain contacts.[9]

20. In some instances gravity flow has effected recoveries equal to, or exceeding those from, water displacement.[9]

21. For gravity drainage the slope of the sand has no effect on the equilibrium vertical variation of the liquid saturation.[9]

22. The gravity drainage rate is related directly to the slope of the sand strata.[9]

23. The more irregular the sand body the more oil will be retained by isolation in the pendular region after gravity drainage.[9]

24. Variable gas velocities will exist even in homogeneous sands. Thus, unstably located gas caps can form in any region of the structure where gas velocity is at a minimum.[9]

25. Rate of gravitational segregation is favored by low viscosity. Gas in solution lowers viscosity. Hence, any process which retains or increases gas in solution favors high rate of production.[9]

26. Rigorous mathematical solution of most petroleum reservoir flow problems offers nearly unsurmountable difficulties.[24]

27. The variation of the water saturation above the water table can be predicted from a consideration of interfacial tensions and capillary forces. However, the applications of capillary pressure measurements are complicated by the fact that capillary-pressure saturation functions are not unique but depend on the previous history of the system. This phenomenon is called "hysteresis." It is possible that lack of equilibrium conditions may partially account for the observed hysteresis. Furthermore, the capillary behavior varies widely for different types of sands.[22]

28. Capillary pressure measurements may be used to predict the pressure gradient necessary to cause discrete gas bubbles to flow through the sand at high liquid saturation and to predict the total liquid saturation when the gas phase becomes continuous and the oil-gas threshold pressure becomes zero. The point at which the gas phase becomes continuous is generally observed to occur below 85 percent total liquid saturation.[22]

B. *Concepts Not Yet Definitely Established*

In addition to the above observations, which may well be fairly basic and permanent, at least without major change, there are some further conclusions which are not so well proved by the data and on which there may be serious disagreement:

1. The amount of interstitial water removable by migration of oil into a water saturated sand will not attain 100 percent, but may approach 90 percent with usual sands.[2,3]

2. Three-phase flow does not take place through any small group of pore channels except during the transition period between oil flow and the subsequent flow of water.

3. The total flux of a gas-liquid mixture varies linearly with the pressure gradient over a limited range of rates.[5]

4. A relation exists between the rate of flow of the driving or displacing fluid and the recovery of the driven or displaced fluid. Controversy exists regarding this point, with one investigator[7] reporting an increase in displacemeent efficiency with increasing rate of displacement at rates compatible with actual oil field observations. Three other investigators, however, report the reverse of this contention. But as these latter tests, contrary to the first mentioned, all provided for interstitial water, it may be possible that this factor may be responsible for the indicated difference.[8,12,15]

Pressure and Recovery

5. For dissolved gas drive conditions it has been reported from laboratory tests that higher rates of pressure decline tend to result in a greater recovery of oil. It is to be noted, however, that the decline rates for which this effect is most noted are far in excess of any rate which could conceivably be attained under actual reservoir conditions.[21]

6. There appears to be a relation between the percents residual and initial oil saturations. This relation is probably apparent only in that both the initial and final saturations are a function of the characteristics of the sand.[10,12]

7. Experiments on tubes of sand (atmospheric moisture not removed) showed that after drainage, water could be passed upward through the depleted sand without displacing any oil, hence it would appear that drainage can remove at least as much oil as water displacement under such conditions.[9]

Future Flow Research

In spite of the foregoing rather impressive lists of conclusions with regard to the flow of fluids in homogeneous permeable media, it will be freely admitted that some reservoir flow problems remain to be solved. For instance, the quantitative use of relative permeability data obtained on high permeability recompacted loose sand to solve problems on tight, consolidated sand is not recommended by the experimenters who should best know the quantitative limitations of their work. In order to understand better what has been accomplished, and thus what remains to be done, Table 1 has been prepared to show the nature of the variables involved in this work. This table was compiled with no intention of criticising any of the work or workers. It is to be understood further that the work covered by this tabulation is not necessarily represented as being all of the best work that has been done, but it is the work that has been studied by the Committee.

Some general remarks should precede the outlining of the specific tests needed to give a fair understanding of petroleum reservoir fluid movement. The underlying principle in all laboratory experiments should be to duplicate, so far as is practical or meaningful, the controlling factors and conditions existing in the formation. The following list of statements represents an attempt to elaborate more specifically the pertinent concepts. In recognition of the fact that these statements may appear too constraining, it should be realized that a reasonable degree of latitude may be permissible in their application.

1. Reservoir sands or comparable materials should be used.

2. Interstitial water should be used in all experiments involving water wet sands. Water should be similar in analysis to formation waters.

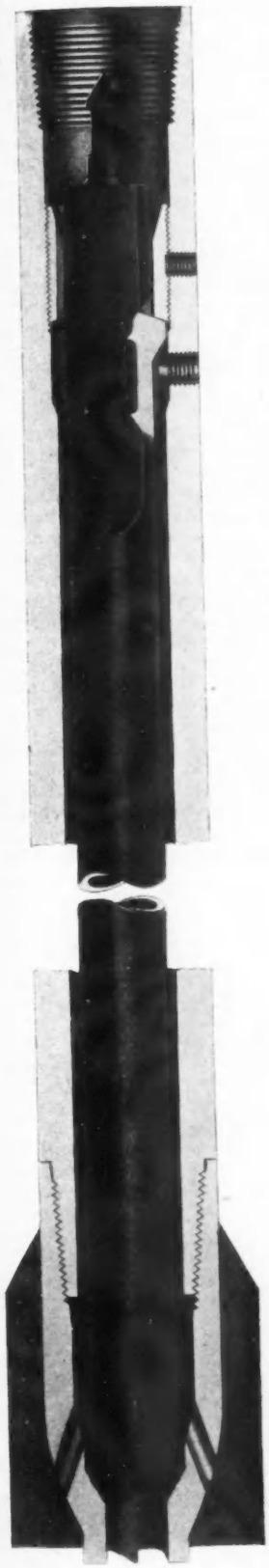
3. In problems involving a gas phase, the gas should be soluble in the oil to be produced rather than in the interstitial water.

4. Refined oils may be used to avoid the gradual change of properties with time as will occur generally with crude oils, but attention should be paid to fair duplication of viscosity, interfacial tension, content of polar bodies that may adsorb on sand, and gas solubility of the type of crude in the reservoir being studied.

Leakage of Fluids

5. Leakage of fluids along the outer surface of the sand sample should be avoided in the case of loose sands as well as of consolidated samples. This involves packing the sand in some container which can be made to yield so as to interlock with the outer grains.

6. Experiments should be so arranged as to avoid end effect, or so that results can be so analysed as to eliminate end effect. One logical analytical method is



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to run several experiments with different lengths of similar core material, and eliminate the effect by analysis of data.

7. Permeabilities should be kept within the range of values found in reservoirs of the type being studied. This will generally involve permeabilities within the range 1 to 20,000 millidarcys, with emphasis on the range 10 to 3000.

8. Flow rates and pressure gradients should be kept within practical limits. A number of different gradients or rates will be needed for duplicating radial flow conditions and for covering water flooding of low gravity crudes, or high rate production of high pressure high gravity crudes. The practical range of linear rates of advance of the fluid front might be met at 0.02 to 5 feet per day. Gradients may well vary from .001 to 2 pounds per square inch per inch.

9. The applicability of electrical analogy experiments should be considered for all but the simplest flow tests, as this technique is versatile and powerful.

The problems which need study are many and complex. They involve oil migration into sand, internal gas drive, gas drive, water drive, and gravity drainage. The chief problem may well be the effect of rate on recovery. Others are concerned with interpretation of core analysis, specifically reconstruction of formation fluid content from core fluid content; studies of by-passing in non-uniform sand; transient and steady states; vaporizing and condensing systems; pressure maintenance or cycling vs. primary recovery; secondary recovery processes.

Tests Recommended

Laboratory work adequate to cover the entire range of reservoir characteristics encountered will involve so many more years of effort that its complete outlining here would be without purpose However, for any specific oil producing region, a relatively restricted number of experiments may suffice. Thus, for California reservoirs, for example, the following tests are recommended to furnish a more complete understanding of their behavior. They do not necessarily represent a complete list, sufficient to establish all the needed facts, but they should point the way to other tests, and should suffice to narrow the regions of unknown reservoir behavior.

Accumulation

It would be useful to know final saturations obtained by forcing oil into water saturated sand, as an aid to other laboratory flow work, since most of such work must be done on artificially saturated sands. The current trouble is in ascertaining the final accumulation saturation (or initial flow saturation) without destroying the test. If such results were generally known, other laboratory work would be facilitated. The variable ranges pertinent to this work would be:

Oil gravity	13	20	30	40
Sand permeability, md.	3000	1000	300	100
Sand type	loose	loose	consol.	consol.
Pressure gradient, psi/i.	.01 to 5.0	.005 to 2.0	.002 to 1.0	.001 to 0.50
Temperature, °F	80 to 120	100 to 140	120 to 180	150 to 250

Relative Permeability

This is the most important topic in flow research. Some of the most extensive work was limited to a narrow range of rather high permeabilities. Extension of the work to cover lower permeabilities is highly pertinent.

Oil gravity	13	25	40
Sand permeability, md.	3000	700	100
Sand type	loose	consol.	consol.
Pressure gradient, psi/i	.01 to 5.0	.003 to 2.0	.001 to 0.5
Temperature, °F	80 to 120	100 to 175	150 to 250

This work should be carried out over wide ranges of ratios of oil, water and gas, to complete a triangular diagram like that of Leverett for the high permeability loose sand, for each of the sands and oils studied.

Recovery Factors (Residual Saturations)

This is the most important result to be derived from flow research and is not as thoroughly understood as it should be. There are six main methods of recovery; internal gas drive, gas drive, water drive, gravity drainage, pressure control operations and secondary recovery schemes. These may be combined in many ways in actual practice, so the entire solution to this complex problem may never be at hand, but the present position should be greatly improved. The admirable attempt by E. C. Babson (AIME, T.P. 1664, Jan. 1944) to use available data to calculate recoveries under several commonly met field conditions brought him to the conclusion that the chief lack of information needed for predicting recoveries was in the field of relative permeabilities, not in actual laboratory recovery tests. Certainly, pressure depletion tests are very difficult to carry out adequately in the laboratory, because of the inherent difficulty of duplicating in a small sample the combination of expansion in a given sand volume, and gas drive from sand volumes more remote from the well.

In the case of water drive and gas drive not involving large pressure changes there is more hope. Tests here should be carried out along some such pattern as follows:

Oil gravity	13	20	30	40
Sand permeability, md.	3000	1000	300	100
Sand type	loose	loose	consol.	consol.
Pressure gradient, psi/i.	.01 to 5.0	.005 to 2.0	.002 to 1.00	.001 to 0.50
Temperature, °F	80 to 120	100 to 140	120 to 180	150 to 250

Gravity drainage deserves more attention than it has had. Sands saturated as suggested under "Accumulation" should be set up and drained in columns preferably not less than 10 feet high, nor less than 1½" in diameter. The variable ranges pertinent to this work should be:

Oil gravity	13	20	30	40
Sand permeability, md.	3000	1000	300	100
Sand type	loose	loose	loose	loose
Temperature °F	80 to 120	100 to 140	120 to 180	150 to 250

Recovery of Liquid Condensate from Sand

Tentatively suggested research includes:

Butanes plus, percent by wt.	10	20	40
Sand permeability, md.	20 to 500	20 to 500	20 to 500
Formation pressure, psi	4500	4500	4500
Formation temperature, °F	240	240	240
Dry gas velocity, ft/day	1 to 50	1 to 50	1 to 50

This is one of the important flow problems that is entirely unsolved. It applies to any condensate gas field where the single phase hydrocarbon occurs at or near its dew point, as operating bottom hole pressures will drop below the dew point unless the reservoir pressure is maintained fully by cycling. Since this is generally uneconomical, condensation occurs around production wells. There is a wide divergence of opinion as to the fraction of such condensate that is economically recoverable by subsequent dry gas flow. Experimental work on this problem is much more difficult than any above outlined, as it necessarily entails high pressures and careful analysis of small quantities of hydrocarbons.

Core Analysis Interpretation (Interstitial Water)

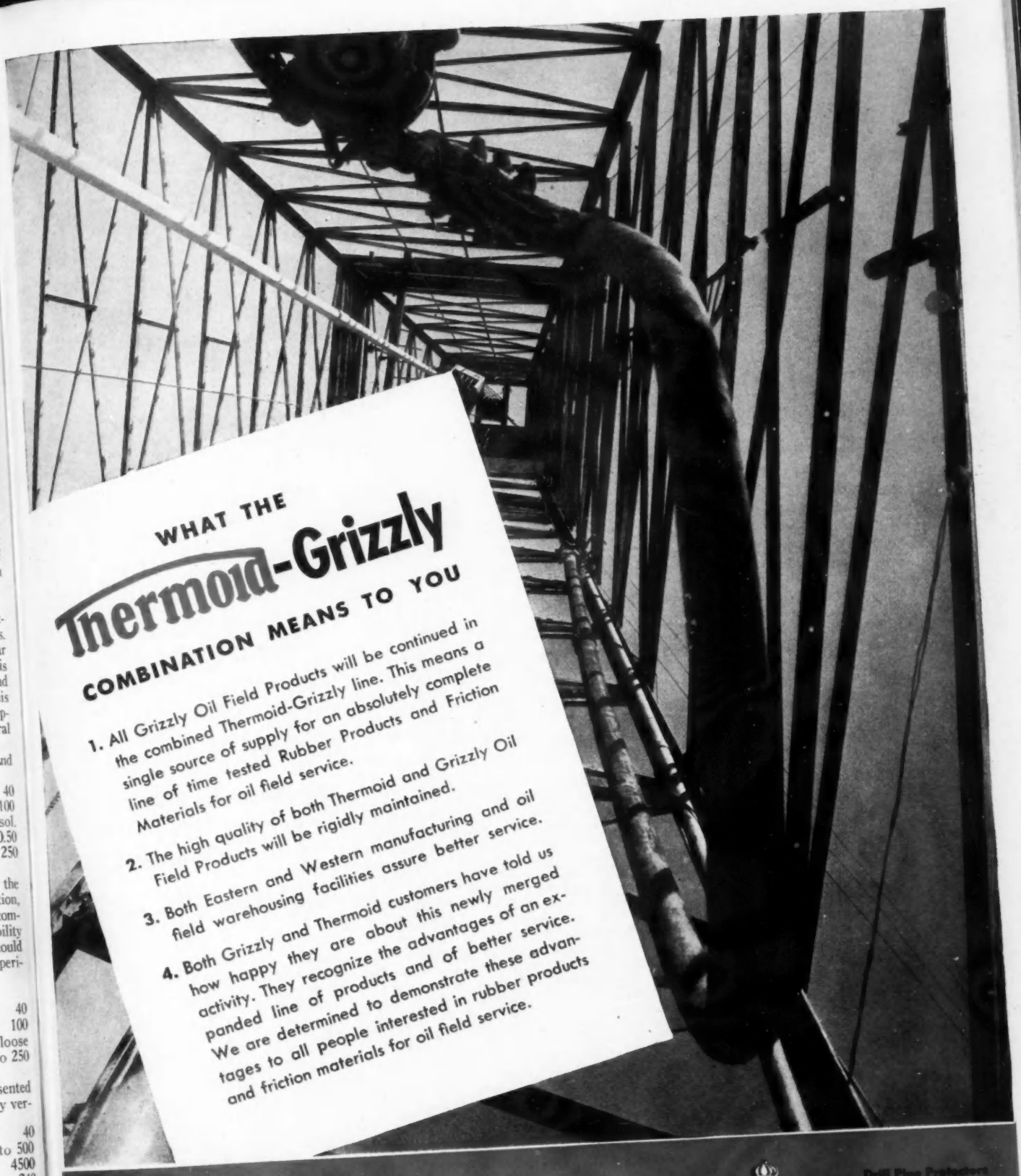
It is desirable to extend flow research to include methods of estimating probable interstitial water. Two general types of experiment are suggested, that described by McCullough, Jones & Albaugh (API meeting, Los Angeles, May 1944) and the more cumbersome two-phase flow method which might set a limit for the amount of interstitial water under given conditions. Both should be pursued, and interpretation of the results should not lag far behind the experimental work. The two phase flow study could be incorporated as a part of the previously suggested research program pertaining to "Accumulation."

Miscellaneous

Bypassing is a largely unpredictable factor involved in most recovery problems. Practical laboratory scale models appear to give only qualitative results. This method of approach is time consuming and limited in general to special cases. This indicates that possibly an analytical approach may yield results of more general value.

Combinations of primary recovery and pressure control methods of operation, the latter either by water or gas injection, should be amenable to analysis, if a complete knowledge of relative permeability were available. In this event analysis could replace complex laboratory model experiments.

The literature has frequently presented distinct curves of relative permeability versus saturation to apply respectively to consolidated or unconsolidated sands. Opinion is divided as to whether such a distinction is justified. Those who think that there is actually a gradual change in sand properties and resulting reservoir behavior involving all intermediate gradations between consolidated and unconsolidated sands would like to see this matter adequately tested. It is thought that the apparently large distinction between curves so far published may be in part a distinction between high and low permeability



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Guide to Variables Involved in Reservoir Fluid Flow Research

TABLE 1

	AUTHOR											
	Wyckoff Botset Muskat Meres	Hassler Rice Leeman	Dunlap	Van Wingen	Botset Muskat	Leverett Lewis	Parsons	Putnam	Krutter	Miller	Earlougher	Hassler Brunner Diehl
Date	1936	1936	1938	1938	1938	1940	1940	1940	1941	1941	1942	1942
Sand Type	loose	consol.	loose	loose	consol.	loose	loose	consol.	consol.	loose	consol.	both
Sand Origin	Ottawa	Bradford	.....	Montérey Ottawa	sandstone	.....	beach	KNDA	oil sand	Ottawa	oil cores	many
Interstitial Water	no	no	I.W.	I.W.	I.W.	I.W.	I.W.	no	part	film	I.W.	I.W.
Oil	no	oil	oil	oil	kerosine	oil	crude	crude	oil	oil	crude	kerosine
Gas	Co_2	air	none	none	gas & CO_2	nitrogen	none	gas	air	none	nat. gas	air
Other Liquids	water	none	water	none	none	water	none	none	none	water	none	none
Sand Porosity, percent	28-43	9.5-17	.....	32-44	19-22	41-44	23	14-24	9-29	37-42	various	.....
Sand Permeability, darcys	17-262	.008-.031	3-13	.20-130	230-480	5-16	300	.175-1.27	.002-3.4	8-10	various	12-500
Pressure gradient, psi	various	42	.....	.09-.55	various	.05-1.1	.....	2-80	1-6	low	7-70	1-20
Driving Fluid	mixture	air	oil	oil	none	mixture	water	mixture	air	water	water	.....
End Effect Precaution	none	cotton	none	none	none	none	none	none	none	none	none	capillary
Wall Effect Precaution	none	sleeve	none	none	none	none	none	rubber	rubber	none	none	diaphragm sleeve?
Viscosity Variations	1	3	1	2	1	2	.....	1	4	1	many	.....
Gradient Variations	various	1	many	3	several	many	.....	many	many	15	many	many
Permeability Variations	3	2	2	3	2	2	1	2	many	1	many	22
Pressures used, psi gage	low	low	.....	0.4-2.7	100-1500	low	.....	500-2000	1-6	low	5-50	1-20
Flow Rate—linear ft./day	.....	.....	1.4-200	25-3700	.....	.....	0.09 to 600	.....	.....	.06-7.2	excessive	.....

behavior rather than between consolidated and unconsolidated sand behavior.

Conclusion

It is obvious that the above outlined tests are only a small fraction of the possible laboratory work in the field of flow research. It is also obvious that they represent thousands of man hours of time. It must be understood that the general comments immediately preceding the outline of tests applies throughout these tests. If their brief description here can make future work any more applicable than it might otherwise be, whether by avoiding inept choice of physical properties and conditions, or by suggesting which work appears the most needed, the Committee will feel that its time has been well spent.

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Geophysicist Address

• CONTINUED FROM PAGE 57

preters should usually arrive at very similar answers. This criterion is so intimately tied in with the fourth, that the two must be studied imultaneouly. An interpretation which satisfies this criterion will very likely combine an application of the theory of the method with geological knowledge concerning the nature of the probable oil traps in the region under investigation. This is not absolutely necessary. The interpretation may be based entirely on an empirical correlation between certain observed phenomena and the occurrence of oil. But such interpretations are usually unsatisfying because they frequently involve too strong an element of personal judgment or intuition and because it is difficult to amass sufficient trustworthy data to substantiate the correlation.

Conclusions

Problems involved in evaluating a proposed geophysical method are difficult and demand the most careful and thoughtful attention. It is a problem that can be solved correctly only by teamwork between geophysicist, geologist and management. Each must contribute his full share and have his full responsibility. The contact between members of the team must be intimate and each must have the confidence of the others. This is not a problem which can be solved by the haphazard methods that have been used in the past. Nor is it a problem that can be solved by oratory or debate. Unless you are prepared to spend the time and money justified by the worth of a new prospecting tool, you will do yourself a service by not wasting your money and effort and the industry a service by not confusing the picture.

In conclusion, while my topic has called for emphasis on possible new methods, your president is neither too optimistic about their possibilities nor too pessimistic concerning the remaining possibilities of present methods. Considerable improvement in our conventional instruments and techniques may be expected. But the future progress of geophysics cannot come entirely from technical advances, either in new methods or improvements of old methods. Much of it must come from advances in the use of the minds of geophysicists.

Leases Bought

A group headed by Homer W. Snowden, Dallas, Texas oil operator, has acquired 720 acres of leases, 26 oil and three gas wells comprising properties owned by the G. C. English Properties and the English Drilling Company in the Cement pool of Caddo County, Oklahoma, for a consideration said to be "in excess of one million dollars." A. Lacy Rollins of Oklahoma City, handled the deal under the terms of which the English Drilling Company will drill five additional wells in the area.

Oil Companies Contract To Buy Two New Tankers

Sale to private operators of two large tankers under construction was announced by the Maritime Commission.

Continental Steamship Company, Baltimore, wholly-owned subsidiary of Continental Oil Company, will take a 16,600 deadweight ton T3-S-A1 type tanker building at the Bethlehem-Sparrows Point Shipyard, Baltimore, at a tentative price of $3,009,000 on which two over-age tankers, the "W. W. Bruce" and the "Ponca City," built in 1918 and 1919, respectively, will be traded in at $1,066,000. The new tanker will have a speed of 15½ knots and a gasoline carrying capacity of 131,136 barrels, against an average speed of 10.25 knots and combined capacity of 162,940 barrels for the traded-in ships.

Union Oil Company of California is buyer of a T2-SE-A1 16,600 deadweight ton tanker building at the Chester, Pennsylvania, yard of Sun Shipbuilding and Dry Dock Company, at an estimated price of $2,800,000 with a trade in allowance of $1,580,000 for the tankers "Cathwood," "Deroche" and "La Placentia," built in 1920, 1919 and 1921, respectively. The new ship will have a 14½ knot speed and capacity of 141,000 barrels of gasoline, against an average of 10.3 knots and a combined capacity of 229,516 barrels for the old tankers.

The new vessels are to be sold at net actual cost to the commission.

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THE OIL WEEKLY

This is an official U.S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

Deadman Anchor Improves High-Line Back-Up Post Setting

DRILL PIPE HANDLING

Embodying a principle slightly different from the conventional high-line backup usually placed on or near the end of the pipe walk, the collapsible post devised by one superintendent has consistently given better results and longer service. Two short lengths of pipe, the upper one telescoping into the lower, are held in an extended position by a heavy bolt run through the two near the center. It is welded to one corner of a triangular steel plate, two sturdy braces extending from the post out to the other two corners. With the plate bolted to the flooring of the walk, the backup is further strengthened by a steel stay hooked into a slot in the back side of the post and anchored to a small deadman buried in the earth at the end of the walk.

Cinched up tightly by a small turnbuckle in this stay, the post has an advantage of being able to withstand a greater pull without the necessity of a heavy or more deeply set anchoring system. Whereas the conventional post consists of merely a heavy post set in a large concrete block, this backup employs only a light deadman, and since the latter is placed under only tensional stress, there is a less tendency to uproot it than in the larger vertical posts where there exists a leverage-type stress which can more easily loosen and uproot the anchor.

An alternative hitch for the deadman guy line is obtained by treading it through an eye at the post support, attaching chain to the deadman and then, by inserting a boomer between chain and guy end, exerting sufficient tension to take out all the slack in the guy. By making the pull through the open side of the wireline clamp, and then tightening the bolts of the unit, the desired strain is imposed on the wire and it is in the condition of being pre-loaded to the point where no flexure in the post is required before the load is transferred to the anchorage.

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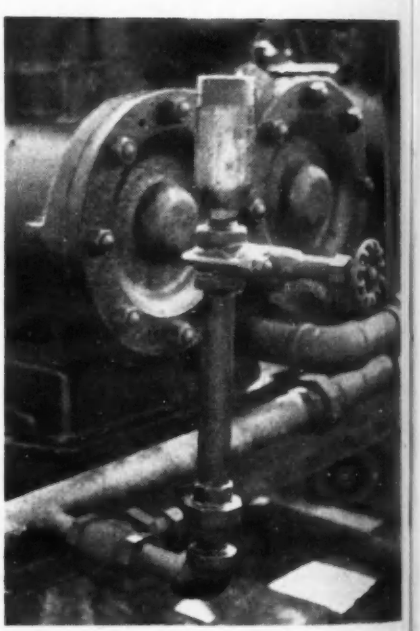
Auxiliary Lubricator Extends Pump Valve Life

MUD PUMP ACCESSORY

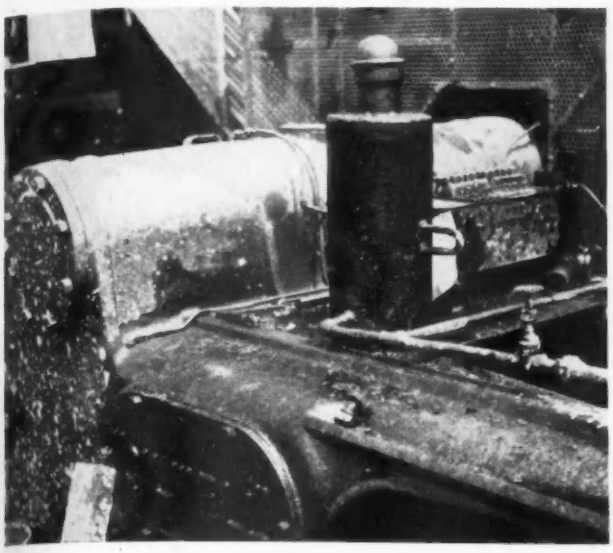
In order to provide a means of admitting light lubricating oil into the steam line leading to the mud pumps, one company installed a dual valve and nipple system that has served the purpose well for the infrequent occasions when such extra lubrication is required. A short 1-inch nipple is welded into the steam line near the cylinder, to which was then attached a globe valve, an elbow, union, and an upright 12-inch nipple, the latter having a gate valve atop it.

Filling the reservoir is accomplished by first closing off the lower valve and opening the upper one. Using an inverted 1- to 2-inch swage as a funnel (screwed into the open upper valve) the oil is poured into the chamber until it is filled, after which the gate valve is closed and the globe valve cracked open until the desired rate of inflow is reached. A small but steady flow of light lubricating oil admitted to the steam line during long periods of uninterrupted pump action, particularly when superheated, dry steam is used, contributes much toward prolonging the life of interior parts of the pumps.



DRILLING HINTS

Piston Rod Packing Lubricator Adds Service



PISTON ROD AUXILIARY

Excellent, inexpensive lubrication of steam engine piston rods at the point where they pass through the packing glands may be obtained in the simple manner used by one drilling company. Instead of trickling small streams of water down over the rod, as is usual, a small container filled with diesel fuel oil is set up on the engine, short lengths of ½-inch line leading over to the pet-cock holes above the rod near the gland end. An 18-inch length of 8-inch pipe having the ends welded closed except for a small filler nipple at the upper end, serves as the reservoir, and small gate valves out near the pet-cocks regulate the rate of flow.

By making the base section or end larger in diameter than the pipe which it closes, it is possible to drill bolt or screw holes through which may be place l fasteners tapped into the casting of the engine apron, to insure against vibration.

Cost of the fluid is extremely small since relatively few gallons will be used per day, depending upon how long the rig is operated in the period. The oil is quickly reclaimed by draining it from the bottom of the shallow catch-basin below the rods, following which it is strained through cloth and again poured into the reservoir. According to company mechanics, the light oil is preferred over water due to its superior lubricating qualities and also because of the added service obtained from packing glands.

Casing Block Pin Extension Oil Feed

CABLE TOOL EQUIPMENT

On cable tool rigs, where the casing blocks are used only intermittently, it is desirable to have a convenient method of oiling, as grease guns are usually not on the job. One operator in Kansas tapped out the grease hole in the side of the block and screwed in a ¾-inch pipe connection and turned up a nipple long enough to hold enough oil to pull a string of casing.

When the blocks are swung out from the back of the rig and lowered, the casers merely raise the bucket which contains the oil for lubricating the casing threads, and pour in the desired amount.

A cap, or collar with plug, forms a simple and effective seal to prevent entry of dirt while idle.

$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston 1, Texas

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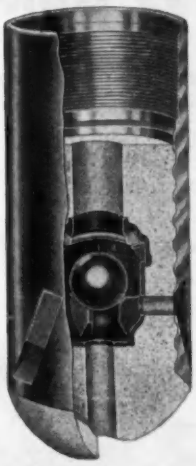

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● It looks different—but the real difference is in its performance. The housing simply won't break or warp—no bother or expense of repairs. Full-floating hookjaw (with handy pipe scale) and replaceable heeljaw take hold instantly, won't lock on pipe. Adjusting nut in open housing spins to pipe size. Powerful comfort-grip I-beam handle eases hard pulls. Ask your Supply House for the rugged work-saver RIGID. We're manufacturing more of them than ever, but it's not enough—please be patient.

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Flood Puts to Use High-Water Installation

Putting equipment on platforms above flood stage in areas subject to high water is one way of getting around damage from floods. The Carter Oil Company is making good use of this method in the East Inman field, Posey County, Indiana. Pumping apparatus on No. 1 E. Theobold, located on the banks of the Wabash River, a stream that often floods wide areas, is mounted on a 27-foot elevated platform. The second worst flood in 105 years spread havoc in this territory recently. The picture (right), showing the pumping jack above water, was made after the water had receded about a foot. Picture on the left was made in "normal" times.

Army's Canol Adventure Closes With Salvage of Project the Big Question

The War Department this week is winding up its ill-fated Canol adventure, and workers from the refinery at Whitehorse shortly will be adding to the output of high-octane gasoline from United States refineries and the Bahrein Corporation plant in the Persian Gulf.

Formal authority to recruit the men for new jobs was conferred on PAW by the War Manpower Commission.

With the Canol project on an inoperative basis, the main question is how much the War Department will be able to salvage out of the $100,000,000 it invested in production, pipe line and refinery facilities under its contract with the Canadian government and Imperial Oil Company. Not included are the facilities built to oil the Alcan Highway, also scheduled to be abandoned, which would have been necessary even if the Canol program had not been undertaken, and which carried an estimated cost of $35,000,000.

Still to come, and viewed with apprehension by the department officials who fathered the project, is a report of the Mead War Investigating Committee. Under the chairmanship of former Senator Harry S. Truman, this committee pulled no punches a year ago when it reported on Canol.

In that report the project itself, the conditions under which it was evolved, the manner in which it was prosecuted, the delays in completion and the results to be attained were all sharply criticised.

More recently the committee again delved into the situation, and it was largely this interest that decided the department to close the project down in June and its insistence that moved the liquidation date up to April.

What the department will be able to salvage out of Canol is set forth in the contracts under which the project was developed. All of the wells drilled on land leased by Imperial Oil will belong to that company, and those drilled on land belonging to the Canadian government will belong to Canada. The pipe line to Whitehorse and the refinery at that point are the property of the United States government, but the contract provides that they cannot be dismantled except with the consent of Canada and must be offered for sale to Canada at a valuation based "upon the then commercial value of the pipe line and the refinery." Such movable equipment as may be located on the project —trucks and other machinery, etc.— also are property of the United States government, which apparently is free to salvage it.

The "then commercial value" of the pipe line and refinery is to be set by agreement between representatives of the United States and Canadian governments, and since the Canadian government and Imperial Oil have no competition in the area, it may be expected that, if either want the facilities, a very low appraisal will be set.

Imperial's Attitude

In the event the other parties to the contract do not want the line and refinery, the War Department is expected to follow its usual policy of disposing of surplus property to the highest bidder, but at not less than the appraised value. Whether any American interest would care to buy them in, and pay the heavy cost of dismantling them, transporting and re-erecting them in the United States appears to be a question into which the department has not delved pending a decision by Canadian interests whether they will exercise their option.

How Imperial Oil may regard the desirability of acquiring these facilities was suggested by the Truman committee in its report:

"Whether there will be any commercial demand for oil products in that area at the end of the war that cannot be more than filled by the Imperial Oil's refinery at Norman Wells is highly questionable. It is unlikely that there will be a demand sufficient to pay the out-of-pocket cost of operating a pipe line and refinery, in competition with Imperial Oil's refinery and in competition with oil products brought to Skagway by tanker. The pipe line is 620 miles long and has ten pumping stations. The cost of maintenance and operation will he high. The cost of operating the refinery in subzero weather also will be high.

"The costs of operating the pipe line and refinery have not yet been accurately determined, but it is estimated that the operating cost will alone nearly equal the combined cost of purchasing an equivalent amount of finished oil products in California and transporting them to Skagway. * * *

"Moreover, no refinery or pipe line is worth anything commercially unless a source of oil can be obtained at a reasonable price. The only sources will be Canada and Imperial Oil, and the price of the oil will be whatever they decide to charge.

"For these reasons, the insertion in the contract of the word 'commercial' will, if the contract is allowed to stand, either require the gift of the refinery and pipe line to Canada, or a request for the consent of Canada that the refinery and pipe line be dismantled and sold for whatever junk value they might have."

The contract still stands, according to the War Department, and the other points raised by the committee are admitted. There has been a considerable amount of oil produced in the Norman Wells area and a good supply of gasoline, fuel oils and other products obtained, but at a very high expense.

You can increase your Rock Bit footage

EFFECTS OF DRILLING WEIGHTS ON DRILLING RATE

(SURVEY OF 34 RIGS IN WEST EDMOND FIELD)

NUMBER WELLS CONSIDERED	WEIGHT OF BIT		DRILLING RATE IN FEET PER DAY	
	CLASS	POUNDS	BLACK SHALE SECTION 5,200-6,400 FEET	OVERALL 5,200 FEET TO TOTAL DEPTH
12	LIGHT WEIGHT	18,000 Lb or Less	71	67
7	MEDIUM WEIGHT	18,000 Lb. to 36,000 Lb.	66	58
15	HEAVY WEIGHT	36,000 Lb. or More	68	58

"The rigs which drilled the Pennsylvania black shale section with light weight on the bit, made more hole per day than the rigs which drilled with medium or heavy weights and reached total depth in an average of 27 days as compared to an average of 31 days for the medium and heavyweight operators.

The saving of 4 days rig time represents appreciable revenue to the contractor."

EXCERPT FROM AN ARTICLE BY E. R. ALBERT, IN THE DECEMBER 2, 1944 ISSUE OF THE OIL AND GAS JOURNAL

Gasoline and Residual Fuel Taken From Tanks as Refiners Again Cut Crude Runs

Although crude oil production was only slightly lower in the week ended March 31 than the week before, crude runs to stills were off substantially, after having declined also in the previous week. The runs therefore were more than 100,000 barrels a day under domestic production, whereas until recent weeks they had been above it through withdrawals of crude from storage and imports. With the new relation, there has been some rebuilding of crude stocks, which increased at the rate of 249,000 barrels daily in the week ended March 24.

On the basis of the reduced refinery runs of the March 31 week, there was a decline in gasoline production and withdrawal of that product from storage, while a heavy withdrawal of residual fuel oil from storage occurred. Stocks of distillate fuel oil increased a little.

U. S. crude production of 4,781,000 barrels daily in the week ended March 31 was 1000 a day less than in the previous week, although nearly 400,000 a day or 9 percent more than the output of 4,383,000 barrels per day recorded for the comparable week a year ago.

Crude runs to stills averaged 4,677,000 barrels daily, down 65,000 from the previous week, but 218,000 a day or 5 percent more than the runs of 4,459,000 daily in the like week last year.

Crude oil stocks stood on March 24 at 221,227,000 barrels, up 1,781,000 from a week earlier although 15,058,000 barrels or 6.4 percent under the 236,285,000 barrels held a year previously.

Production of gasoline in the United States, including natural blended at refineries, averaged 2,092,000 barrels daily in the week of March 31, down 38,000 a day from the week before although 145,000 daily or 7.5 percent above output in the like week last year. Stocks of finished and unfinished gasoline were reduced from the seasonal high of March 24 by 300,000 barrels, an average of 43,000 daily, and then stood at 98,712,000 barrels. That amount was 11,465,000 barrels or 13 percent more than the 87,247,000 barrels held April 1, 1944. However, civilian grade gasoline stocks are only nominally above the level of a year ago, totaling 52,809,000 barrels against 51,582,000. Stocks of military and other grades of gasoline are at 45,903,000 barrels compared with 35,665,000 a year ago.

Distillate fuel oil production of 650,000 barrels daily in the week ended March 31 was 14,000 a day more than in the previous week and 36,000 a day or 5.7 percent more than output in the comparable week a year ago. Stocks were increased at the rate of 15,000 barrels daily and then totaled 26,889,000 barrels. But they were about 3,000,000 barrels or 10 percent under the 29,926,000 barrels held a year before.

Residual fuel oil production of 1,312,000 barrels daily was 2000 a day more than in the previous week and 82,000 a day or 6.6 percent more than output in the like week last year. Stocks were reduced during the week by the large amount of 226,000 barrels daily, having declined to 41,745,000 barrels. That amount, another new low for modern times, was 10,448,000 barrels or 20 percent less than the 52,193,000 barrels reported for the corresponding date a year ago.

Lubricating Oils Revenue Declines, Gasoline Jumps

Treasury revenue from the federal tax on lubricating oils declined nearly $1,000,000 in February, as compared with the preceding month, but the loss was more than offset by increases of $3,400,000 in receipts from gasoline and $460,000 from pipe-line transportation, it was reported by the Internal Revenue Bureau.

Collections from lubricating oils dropped from $6,827,325 in January to $5,306,976 in February.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gasoil and Distillate Stocks Barrels	Gasoil and Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1941	4,337	11–22	4,120	10–18	266,187	3–29	99,727	3–29	[1]54,983	11–15	102,448	1– 4
1942	4,337	2– 7	3,961	1– 3	263,208	3–28	[1]109,281	3–14	47,861	11–14	95,857	1– 3
1943	4,436	11–13	4,331	12– 4	245,752	5–29	94,159	3–20	47,187	11–27	72,881	1– 2
1944	4,762	9–30	4,798	12–30	240,992	1– 1	89,162	4– 1	48,863	10–28	64,644	10– 7
1945	[1]4,782	3–24	[1]4,803	2–24	221,628	1–20	99,012	3–24	38,298	1– 6	56,074	1– 6
Lows:												
1939	[3]1,601	8–26	3,125	2–18	[2]229,127	10–12	71,152	10– 7	20,722	4–15	105,397	4– 8
1941	3,364	1–11	3,490	1–18	240,399	11–15	79,923	10– 4	28,382	4–12	90,914	7–12
1942	3,297	7– 4	3,393	5–23	231,896	12–12	75,934	12– 5	29,240	4–25	72,962	12–26
1943	3,821	1– 9	3,579	3–13	232,191	1– 9	68,182	10–16	30,732	4– 3	57,596	12–25
1944	4,357	1– 1	4,228	2–12	220,258	9– 9	76,302	1– 1	30,232	4–19	49,737	3–18
1945	4,678	1– 6	4,656	1– 6	[4]218,675	3– 3	86,616	1– 6	26,483	3–17	41,745	3–31

TRENDS OF 1944 AND 1945

Trends in Week Ended:	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil and Distillate Production Weekly	Gasoil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1944:									
January 1	4,357	4,453	240,992	13,192	76,302	4,575	42,310	9,141	57,330
January 29	4,409	4,359	240,251	13,427	81,075	4,054	37,266	8,889	52,857
February 26	4,423	4,377	237,137	13,183	85,248	4,558	33,766	8,952	51,387
March 25	4,385	4,443	236,285	13,362	87,287	4,979	31,319	9,013	51,669
April 1	4,383	4,435	234,667	13,824	89,162	4,450	30,530	8,367	51,326
April 29	4,431	4,300	235,342	13,126	88,462	4,284	30,236	8,398	49,985
May 27	4,514	4,532	234,423	13,502	86,468	4,702	32,035	8,568	49,812
July 1	4,587	4,638	228,860	14,052	83,559	4,496	35,360	8,872	52,235
July 29	4,608	4,627	225,112	14,115	82,665	4,833	38,135	8,900	56,280
August 26	4,667	4,698	222,931	14,112	80,740	4,566	41,453	8,680	59,839
September 30	4,762	4,775	222,393	14,494	78,028	4,622	45,329	9,292	64,226
October 28	4,740	4,658	223,235	14,117	79,058	4,772	48,705	8,985	64,382
December 2	4,712	4,693	221,591	14,853	80,427	4,082	45,832	8,981	61,727
December 9	4,704	4,552	220,258	14,611	80,880	4,056	44,436	8,923	60,458
December 16	4,695	4,537	222,075	14,145	82,747	4,353	42,413	8,727	59,280
December 23	4,729	4,682	222,575	14,635	83,355	4,605	40,846	8,798	58,509
December 30	4,705	4,798	222,998	15,342	86,614	4,257	39,495	9,156	57,430
1945:									
January 27	4,727	4,756	221,310	14,957	88,223	4,843	33,651	9,252	51,119
February 24	4,777	[1]4,803	219,351	15,500	95,972	4,958	28,753	9,084	46,713
March 3	4,765	4,753	[4]218,675	14,704	97,603	5,026	28,110	8,728	45,021
March 10	4,768	4,777	218,760	14,557	97,310	4,887	27,001	9,752	44,150
March 17	4,774	4,773	219,486	14,481	98,882	4,527	26,483	9,042	43,718
March 24	[1]4,782	4,742	221,227	14,907	99,012	4,448	26,782	9,166	43,327
March 31, 1945	**4,781**	**4,677**	.....	**14,644**	**98,712**	**4,548**	**26,889**	**9,184**	**41,745**
April 1, 1944	4,383	4,459	[5]236,285	13,628	87,247	4,303	29,926	8,613	52,193
Change:									
In week	—1	—65	+1,741	—263	—300	+100	+107	+18	—1,582
In year	+398	+218	—15,058	+1,016	+11,465	+245	—3,037	+571	—10,448
In year	+9.1%	+4.9%	—6.4%	+7.5%	+13.1%	+5.7%	—10.1%	+6.6%	—20.0%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, March 25, 1944.

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BRANCH STORES AT ALL IMPORTANT PLACES IN THE OIL COUNTRY

FPC-Approved Panhandle Program to Hike Eastern Gas Supply 50 Million Feet Daily

First of the three big projects designed to prevent a natural gas shortage in the Appalachian area next winter—the $8,325,000 program of Panhandle Eastern Pipe Line Company—was approved by the Federal Power Commission April 3.

The new facilities will add 50 million cubic feet per day to the delivery facilities of 333 million cubic feet now operating, the additional gas going to the Ohio Fuel Gas Company under contracts calling for the delivery of 25 million cubic feet daily for 20 years and another 25 million cubic feet for 5 years from the date of first delivery.

The commission, however, turned down a provision that either party may terminate the delivery of 25 million cubic feet after the war emergency ends, expressing the opinion that Panhandle has indicated an intention "to utilize such gas for the purpose of expanding its industrial and other markets at such time," and attached conditions to the certificate that the facilities authorized shall not be used for the transportation or sale of natural gas to any new customer without specific authorization, and no service rendered by means of the new facilities to The Ohio Fuel Gas Company shall be abandoned or terminated without prior approval.

The new facilities, to be completed by November 1, include a 2400-horsepower compressor station in the Hugoton gas field, Kansas, to cost $435,000, and additional compressor units at existing stations as follows: four 1300-horsepower units at Greensburg, Kansas, to cost $950,000; three 1300-horsepower units at Haven, Kansas, $700,000; five 800-horsepower units at Olpe, Kansas, $700,000; five 1000-horsepower units at Louisburg, Kansas, $1,135,000; four 1300-horsepower units at Houstonia, Missouri, $940,000; four 800-horsepower units at Centralia, Missouri, $525,000; four 800-horsepower units at Pleasant Hill, Illinois, $525,000, and one 1000-horsepower unit at Glenarm, Illinois, $325,000.

In addition, 32 miles of 24-inch loop lines will be constructed in Ohio and Indiana at a cost of $1,077,000; valves along main line No. 200 will be changed at a cost of $455,000, and improvements will be made at a number of compression stations in Texas, Kansas, Illinois and Indiana.

The additions and changes will permit an increase of pressure on line No. 22 from Liberal, Kansas, to Zionsville, Indiana, from 500 to 600 pounds per square inch. The construction and the drilling of additional wells and installation of new field facilities will be financed by an issue of $10,000,000 first mortgage and first lien 2¾ percent bonds.

More Needed

The commission pointed out that although deliveries into the Appalachian area of additional gas through the new line of Tennessee Gas and Transmission Company from the Stratton-Agua Dulce field, Texas, which was completed last fall will materially assist in meeting next winter's demand through replenishment of underground storage facilities this summer, the evidence clearly indicates that it will be necessary to augment the supplies in the Appalachian region further to assure maintenance of adequate service.

The commission found that Panhandle has gas reserves available under lease and purchase contracts to last more than 30 years at the expected rate of withdrawal.

Houston Firm to Construct Louisiana-Mississippi Line

Sharman & Allen, Houston contractors have been awarded a contract by the Interstate Pipeline Company for the construction of a 140-mile pipe line from the North Baton Rouge Refinery in Louisiana to the Mallalieu fields in Lincoln County, Mississippi.

Although some of the right-of-way remains to be purchased, Sharman & Allen intends to start work on the new construction this week.

The line is to be in three sections as follows: a 12-inch line from the North Baton Rouge Refinery in a northeasterly direction to Liberty, Mississippi, which will be about 50 miles in length, then northwest to the Cranfield field of Mississippi, about 15 miles east of Natchez, with an 8-inch line on to Liberty, Mississippi, then in a northeasterly direction to the Mallalieu field, 10 miles south of Brookhaven, with the 10-inch section. This line will serve as a connection from the Cranfield field of Mississippi to the Holly Ridge and Lake St. John fields of North Louisiana.

Cherryhomes Discovery Area Is Given Outlet

Sinclair Refining Company, pipe line division, has provided a market outlet for the new Cherryhomes discovery area in Jack County sector of the North Texas district by laying 3½ miles of 2-inch line to its Hensley station.

Louisiana-Tennessee Line Wins Court Endorsement

The United States Fifth Circuit Court of Appeals handed down an opinion March 31 endorsing Federal Power Commission approval of a new Louisiana-Tennessee natural gas line.

In an opinion by Justice Joseph C. Hutcheson, a three-man court, meeting in New Orleans, denied a petition by two Louisiana state agencies to set aside an FPC permit for construction of a loop from Monroe, Louisiana, to the Memphis Natural Gas Company.

P. F. Frye, chairman of the Louisiana Natural Gas Conservation Committee, said the case probably would be appealed to the United States Supreme Court but declined further comment pending a study of the circuit court opinion.

Construction of the proposed loop was halted by a circuit court order last December after Louisiana parties charged out-of-state interests with "looting" the state's natural resources.

Central Oklahoma Field Given Pipe Line Outlet

The first pipe line outlet for the Northeast Arcadia field of Oklahoma County in Central Oklahoma, is now in operation. The Sohio Pipe Line Company has completed 7½ miles of 3-inch line from the field to a connection with the Interstate Pipe Line Company trunk system in Northeastern Oklahoma County and is moving about 700 barrels of oil daily which had been trucked from the field to Luther, where it was loaded in tank cars and shipped to the Imperial Oil Refinery Company's plant in Canada. More than 123,000 barrels of oil moved in this manner but shortage of tank cars prevented continuation of this operation.

16-Inch, 31-Mile Gas Line For New Mexico Approved

El Paso Natural Gas Company, El Paso, has been authorized by the Federal Power Commission to construct a 31½-mile 16-inch relay natural gas line from its Eunice district compressor station, Lea County sector of New Mexico, southeast to its Jal natural gasoline plant and booster station. This proposed new outlet for the Eunice area will provide an additional 20,000,000 cubic feet of processed sour gas daily for its double line to El Paso and distribution centers in Southwestern New Mexico, Arizona and Mexico.

40-Mile, 6-Inch Line from Steamboat Butte Planned

Toronto Pipeline Company has made application to the Wyoming Public Service Commission for approval to construct 40 miles of 6-inch oil line from the Steamboat Butte oil field in Fremont County, Wyoming, to the railroad at Shoshone.

A hearing on the proposal is to be held April 10.

Oil Line Authorized

Hunt Oil Company, Dallas, has authorized the construction of a 6-inch line from its Gilbertown field, Choctaw County, Alabama, to the New Langsdale field, Clarke County, Mississippi.

Creole Plans Operations In Central Venezuela

Creole Petroleum Corporation is constructing camp facilities and putting in roads in preparation for drilling operations in the Urdaneta district of extreme southern Aragua, Venezuela, where it holds exploration and exploitation rights covering about 700,000 square kilometers, some of which is in the Mellado district of Guarico.

Nearest established production is in the Mercedes field, now being developed by The Texas Company subsidiary, S. A. P. Las Mercedes. The new Creole camp is approximately 35 miles northwest of the Mercedes field, near the town of Barbacoas.

Consolidada Production Is 10,300,000 Barrels

Compania Consolidada de Petroleo produced and shipped by pipe line and tanker 10,300,000 barrels of oil from the Santa Barbara and Muri fields of eastern Venezuela in 1944, according to Venezuelan Petroleom Company, parent concern.

In addition, 2,700,000 barrels were purchased from Creole Petroleum Corporation, Mene Grande and Pantepec Consolidated of Venezuela wells in adjoining properties in order to maintain maximum operating rate of the company's pipe line at 35,000 barrels per day.

Yopales Field, Venezuela, Has 15 Producing Wells

There are 15 producing wells in the Yopales field, seven miles southwest of the Oficina field, central Anzoategui, Venezuela. Another well was being drilled in February. The field is in Creole concession property, with drilling and operation handled by Mene Grande Oil Company.

Three Wells Now Drilling In Barco Concession

Tres Bocas 4, deep test to be drilled to the Cretaceous in the Tibu area of the Barco concession, Colombia, was reported to be at 2023 feet on March 18. On the Socuavo dome, to the north, Socuavo 15 was completed as a flowing well on March 12, and drilling was nearing completion depth below 5000 feet at Socuavo 16. Socuavo 17 was drilling at 1338 feet on March 18. All producing wells in the Tibu fields are bottomed in the Ecocene pay section.

Major Gas Discovery May Supply Moscow's Needs

The discovery in January of a major gas field near Morshansk, midway between the Saratov gas field and Moscow, may result in alteration of Soviet plans to lay a 500-mile pipe line this year from the Saratov field to Moscow. Instead, two lines, each approximately 250 miles in length, may be put in—one from Saratov to Stalingrad, and the other from the Morshansk field to Moscow.

Definite plans await the outcome of a drilling program now in progress to establish the probable potential yield at Morshansk. The projected Saratov-Moscow line was to have been a rush project scheduled for completion before October.

Damman Field Development To Bring Increased Output

Producing operations of Bahrein Petroleum Company and Arabian American Oil Company attained a combined output rate of 60,000 barrels per day by the end of 1944, according to officials of The Texas Company and Standard Oil Company of California, joint owners. Approximately 80 percent came from the Damman field on the mainland of Saudi Arabia. Development now underway at Damman is expected to result in an increase in daily output to 120,0000 barrels by the latter part of the year.

Northern Ecuador Wildcat Abandoned at 5118 Feet

International Petroleum Company has abandoned Camarones 1, wildcat southwest of Esmeraldas, on the north coast of Ecuador, after drilling to 5118 feet. This is the well which was reported to have "blown in" several months ago. No shows were encountered in the hole, which was electric logged before abandonment.

Haitian and Dominican Tests Are Abandoned

The Atlantic Refining Company is reported to have halted drilling operations preparatory to abandonment of its second Maissade test 30 miles northeast of Port au Prince, Haiti, The Haitian Petroleum Company has been jointly interested in the operation.

To the east, across the border of the Dominican Republic, the Commendador wildcat has also been abandoned.

No new test wells are in prospect on the island of Hispaniola, where nine dry holes have been put down since 1939.

Reports 16 Exploration Parties Work in Mexico

Sixteen exploration parties are working in Mexico, looking toward fulfillment of the government's 1945 oil development program which has 72 wells projected. In 1944, 34 wells were drilled.

Oil production last year was 36,400,000 barrels and 34,600,000 barrels were refined in plants of "Pemex", the government oil company. In addition to 72 wells planned for this year, 87 wells are to be reconditioned, Efrain Buenrostro, general manager of "Pemex", revealed March 16.

Refinery and other enlargements are also contemplated for 1945 and a pipe line is to be constructed from Poza Rica to Irapuato, where a refinery is to be built.

"Pemex" budget for all activities in 1945, including operation and maintenance costs and investments, is 435 million pesos, highest in the company's history.

Eighth Guico Well Drilling

Socony-Vacuum Oil Company spudded in at its No. 5 location in the Guico field on February 24, and drilling was in progress below 1300 feet on March 14. The Guico field is a northward extension of the West Guara field, in the Greater Oficina area of central Anzoategui, Venezuela. In mid-March Guico 7 and 8 wells were drilling at 3652 and 4862 feet, respectively.

Amacuro Test Under Way

Texas Petroleum Company spudded its second wildcat test well north of Tucupita, Delta Amacuro, Venezuela, on February 22, and was drilling at 4129 feet on March 27. This is the No. 1 location in the company's Amacuro block. The first well was put down at the No. 2 location and was abandoned as a dry hole in January. The present operation is approximately 1½ miles south of the No. 2 site.

Wildcatting Continues

International Petroleum Company continues wildcatting operations in the province of Guayas, Ecuador, north of the Gulf of Guayaquil. In the middle of January the company's Daular 2 was drilling below 6616 feet, and a newer well (Las Canas 1) was drilling below 4887 feet.

Cuba Test Started

Standard Oil Company of Cuba has abandoned Guanal 1 and 1-A wells east of La Coloma, in Pinar del Rio province, Cuba, and on March 5 spudded its third wildcat test in the area. The new operation, Rojas 1, is one kilometer north of the village of Pelenque.

Australian Test

The deep rotary test at Nelson, Victoria, Australia, being drilled by Western Petroleum, is now standing at 6721 feet, waiting for drill pipe which is being shipped from New Zealand, and for the installation of another boiler and mud pump. The tract under exploration contains 128,000 acres and is held under Prospecting License No. 137.

Kansas Properties Sold

The National Co-Operative Refinery Association has purchased the properties of Pryor & Lockhart, Incorporated, independent oil producing company of Wichita, Kansas. The transaction marks the first time the association has affected an outright purchase of a producing company although it holds interests in ten producing firms.

☆ Oklahoma

Cromwell Pool Opened by Okfuskee County Wildcat

Sykora wildcat opens Cromwell pool in Okfuskee County; deep Anadarko Basin test flows 35 barrels an hour on drill-stem and sets pipe for production test; Ace Gutowsky's Alfalfa County wildcat runs tubing after perforations opposite Oswego lime section show oil and gas.

Okfuskee County: A Cromwell pool was opened about 2 miles west of Paden when J. E. Crosbie, Inc., and Warren Petroleum Corporation's Sykora 1, NE NE SW 20-12n-7e, which had been testing for several weeks, flowed at the rate of 50 barrels of clean oil an hour for about 3 hours and later tanked 170 barrels of oil in 17 hours. Drilled to 4696 feet in the Wilcox sand, which was dry, operators plugged back to 3950 feet and cleaned out from 3846 feet. It swabbed about 7 barrels of oil an hour from the Hunton lime before plugging back to the Cromwell, which was topped at 3870 feet. Mid-Continent Petroleum Corporation is running a pipe line connection to the new producer.

McClain County: After flowing 35 barrels of oil an hour on drill-stem test, The Carter Oil Company's McBride 1, C SE NW 9-7n-3w, in the Anadarko Basin west of the Nemaha Ridge, has set oil string and was preparing to test the second Wilcox sand. The test is approximately ½ mile south of Carter's Cottingham 1, which opened the Washington pool and is running about 30 feet higher than the well to the north. The well is at 10,647 feet, with second Wilcox sand indicated at 10,582 feet. Several cores showed good porosity, saturation and stains and the wildcat has all the earmarks of a producer. Considered an extension to the Washington area, the fact that it is checking high is significant and indicates that the deep pool which Carter seeks in the area may trend southward.

Alfalfa County: Ace Gutowsky et al's Young 1-A, C NW NW 14-24n-11w, near McWillie, was preparing to test a good oil and gas show in the Oswego lime at 5850-5900 feet and looms as a pool opener and the first commercial producer for Alfalfa County. Showings were reported in the Layton zone at 5320-5510 feet and pipe was set and the test deepened. Tubing was run and operators plan to retest the Layton sand which has proven very productive in other sections of the state.

Garfield County: The second producer for the New Garber pool in the eastern part of the county was showing at Cities Service Oil Company's Ford 1, NW SE NW 31-23n-3w, when the well, which is a north offset to the Mariner 1 that opened the pool early this year, tested an estimated 5 million cubic feet of gas on a drill-stem test in the Wilcox sand between 4930-5005 feet. The Mariner well had an estimated 10 million cubic feet of gas in the same zone before drilling to the Arbuckle, where it was completed for 2500 barrels of oil daily. The Ford test will go to the same zone for completion.

The area is a "hot spot" with a number of operators playing the new strike. Cities Service's Wilkinson 1, NW NW NE 6-22n-3w, was drilling below 5015 feet looking for the pay; Champlin Refining Company's Hayes 1-C, C NW NW 31-23n-3w, was drilling below 2000 feet; The Ohio Oil Company's Hermansky 1, SE SE SE 36-23n-4w, topped pay at 5259 feet and lost returns at 5307 feet and was working to reestablish circulation; Ohio's Ebert 1, SE SE SE 1-22n-4w, recovered mud on drill-stem test, stuck tools, and was fishing at 5283 feet.

Grady County: Magnolia Petroleum Company set pipe for a production test at Cunningham 1, C SE SE 33-5n-6w, southwest of Ninnekah. The wildcat was drilled to 10,891 feet and is considered a likely pool opener. It logged a thick sand section in the Pennsylvanian and nearly went out of control when it heaved as drill pipe was being pulled out of the hole.

Carter County: Continental Oil Company's Dotson 1, SW NW NE 7-2s-3w, pool opener extending the Crescent field a mile to the southwest, was tearing down rotary to install pumping equipment; operator's Duke 1, SW SW SE 28-5n-8w, was drilling below 6194 feet and Moyer 1, NW NW SE 31-2s-2w, was drilling below 5385 feet.

Oklahoma to Increase April Output 4500 Barrels Daily

Reflecting the increasing demand for oil needed in the final drive in the European war and the offensive against Japan, Oklahoma oil operators will increase their output in April to 367,500 barrels a day, an increase of 4500 barrels a day over oil runs for March following action of the Oklahoma State Corporation Commission which increased the state's production allowable. In February the state produced 362,097 barrels of oil a day, exceeding the state's quota by 1597 barrels. Present production is averaging 369,500 barrels a day.

Four new fields have been added to the list of allocated areas in Oklahoma, including the Fairview, Southeast Aylesworth, New Garber and West Stillwater pools.

Wells Completed in United States in Week Ended April 7, 1945

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second issue of each month. More detailed data on wildcats published in third issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Alabama	....	....	....	1	1	....	....	....	....	....	1	....	5	3
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Arkansas	3	....	....	2	5	....	....	....	....	....	5	2	33	49
California	16	....	....	....	16	....	....	....	1	1	17	46	524	482
Colorado	2	....	....	....	2	....	....	....	....	....	2	....	9	8
Florida	....	....	....	....	....	....	....	....	....	....	....	....	4	....
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	2	1
Illinois	13	....	....	3	16	....	1	....	4	5	21	20	429	414
Indiana	3	2	....	2	7	....	1	....	2	3	10	....	80	82
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Kansas	5	1	....	9	15	3	1	....	3	4	22	31	366	474
Kentucky	1	....	1	3	5	....	....	....	2	2	7	....	125	164
Louisiana	15	1	....	8	24	....	2	1	3	6	30	12	243	161
North Louisiana	5	1	....	3	9	....	....	1	3	4	13	5	80	48
South Louisiana	10	....	....	5	15	....	2	....	....	2	17	7	163	113
Michigan	6	....	....	3	9	....	1	....	7	8	17	....	177	147
Mississippi	5	....	....	....	5	....	....	....	2	2	7	4	97	26
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	10	3
Montana	3	....	....	....	3	....	....	....	....	....	3	3	50	66
Nebraska	....	....	....	....	....	....	....	....	....	....	....	....	2	7
New Mexico	7	....	....	2	9	....	1	....	2	3	12	10	136	112
New York	15	....	10	....	25	....	....	....	....	....	25	25	217	315
Ohio	1	1	....	1	3	....	....	....	....	....	3	4	179	212
Oklahoma	24	3	....	10	37	1	1	....	3	4	42	43	594	388
Pennsylvania	27	4	15	1	47	....	....	....	....	....	47	45	708	720
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	3
Texas	72	21	....	16	109	6	4	....	28	32	147	147	1,843	1,372
E.Tex.Bor. Co.'s	....	....	....	....	....	....	....	....	....	....	....	....	20	4
E. Texas Field	....	....	....	....	....	....	....	....	....	....	....	....	....	3
Rest of E. Texas	....	....	....	1	1	....	....	....	3	3	4	2	51	74
North Texas	17	....	....	4	21	1	....	....	6	6	28	39	404	319
W. Central Tex.	6	4	....	2	12	1	1	....	8	9	22	9	112	98
West Texas	20	....	....	2	22	2	....	....	3	3	27	44	483	372
Tex. Panhandle	4	13	....	....	17	....	....	....	....	....	17	12	162	50
G. Coast, Upper	6	1	....	2	9	1	1	....	4	5	15	13	186	117
G. Coast, Lower	10	2	....	2	14	....	2	....	2	4	18	17	268	216
Southwest Texas	8	1	....	3	12	....	....	....	1	1	13	10	133	95
S. Central Tex.	1	....	....	....	1	1	....	....	1	1	3	1	24	24
West Virginia	3	11	....	2	16	1	....	....	....	....	17	18	201	244
Wyoming	1	....	....	1	2	....	1	....	....	1	3	2	41	41
Total U. S.	222	44	26	64	356	11	13	1	57	71	438	412	6,076	5,498

* Includes distillate wells. † Includes salt water disposal wells.

☆ Kansas

Gas Pool Opened Five Miles From Coats, Barber County

Gas pool opened 5 miles south of Coats; Ellis County discovery swabs 4 barrels of oil an hour and prepares to take pumping potential; wildcat 2 miles northwest of Ray pool sets production string to test good oil shows; Stanolind test 8 miles west of Hugoton area recovers 2 million cubic feet of gas through drill stem.

Barber County: Along a northwest trend on the flank of the Kansas Uplift, Lion Oil Refining Company has opened a gas area about 5 miles south of Coats in the north portion of the county. Tested in the Arbuckle lime between 4515-17 feet, Allen 1, NW NE NE 2-30s-14w, flowed an estimated 6 million cubic feet of gas. The strike is nearly 6 miles north of Lion's Lemon 1, a gas producer from the Viola lime in 28-30s-13w.

Ellis County: After swabbing 4 barrels of oil an hour from perforations opposite 3380-85 feet in the Lansing lime, Darby & Bothwell, Inc.'s Richards 1, SE SE SW 6-11s-18w, about a mile northwest of the Richards pool, awaited pumping equipment to take potential. Log of the wildcat shows the Lansing checking 26 feet higher than the same zone in the Richards pool and operator expects to complete a good pumper.

Norton County: Helmerich & Payne, Inc., was taking pumping potential at Hansen 1, C SW NW 26-5s-21w, likely pool opener, 2 miles northwest of the Ray field. Drilled to 3720 feet, total depth, operator was testing several zones in the Lansing lime between 3338-3566 feet. Electrolog survey of the Arbuckle showed good porosity and saturation from 3654-91 feet.

Stanton County: After plugging back from 2627 feet to 2530 feet to shut off bottom hole water, Stanolind Oil and Gas Company tested CC&P 1, in the center of 31-28s-39w, and recovered an estimated 2 million cubic feet of gas from zones between 2487-2530 feet. The wildcat is 8 miles west of the Hugoton gas area and Stanolind has reported a number of good gas shows.

Missouri

Claude McQueen's Patterson 1, C NW NE 14-64n-38w, Nodaway County, was abandoned at 1225 ft after operator stuck drill pipe and failed to recover. Derrick has been skidded 30 feet and preparations were under way to begin Patterson 1-A.

Platte County: Fell & Reid's Klam 1, SE SE SE 19-51n-33w, wildcat northeast of Parkville, reported an oil show at 1072-75 feet and was drilling below 1140 feet. Mississippi lime was topped at 957 feet.

Jackson County: Charles Smith's Fee 1, NW SE SE 29-47n-33w, was completed as a water well at 965 feet after topping Mississippi lime at 860 feet.

Nebraska

Amerada Petroleum Corporation was moving in tools on State of Nebraska 1, C NE SE 16-33n-49w, Dawes County. The test is on a large block of acreage surveyed with seismograph last year.

Scotts Bludd County: The Fuerst Oil & Development Company's Dorsch 1, NW NW NW 6-20n-54w, was shut down at 5275 feet waiting on crew.

Garber Allowable Set

Oklahoma State Corporation Commission has fixed the per-well allowable in the New Garber pool of Garfield County at 150 barrels. The field was opened by Cities Service Oil Company's Mariner 1, C NW NE NE 6-22n-3w, which flowed an estimated 2500 barrels of oil per day from the Arbuckle lime at 5294 feet, with bottom hole pressure of 2250 pounds. Four additional wells are drilling in the area, which is considered one of Oklahoma's major oil strikes this year.

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☆ New Mexico

Lea Clear Fork Discovery Shows Response to Acid

Lower Clear Fork Discovery in Lea County responds to acid; Drinkard deep area is erratic in performance; West Lovington field outpost nearing decisive level.

Lea County: Gulf Oil Corporation's State-Andrews 1, 1⅝ miles southeast of its Drinkard-Yeso pool discovery, flowed 270 barrels of oil in 9 hours then dropped to 195 barrels in 23 hours after using 2000 gallons of acid through basal Clear Fork perforations at 6950-7000 feet. Another acid treatment will be made before taking official gauge.

This new-pay discovery failed to produce from perforations at 7210-7320 feet, although the section registered favorable oil saturation and porosity.

The Texas Company's Blinebry 1, northeast offset to the Drinkard-Yeso field discovery, resumed coring after testing 90 feet of rotary fluid with only trace of oil in anticipated pay section at 6312-6475 feet.

Phillips Petroleum Company's State-Lea-Mex 4, Maljamar field Ellenburger project, was drilling in unidentified formation at 11,175 feet. This operation is fenced off and board walls surround the slush pits to handicap information seekers.

El Paso Natural Gas Company's State-Ramsco 1, 1⅜ miles northwest of the West Lovington field, was drilling lime at 4895 feet, having logged base of salt at 3100 feet, or 43 feet high to nearest producer.

The Texas Company's Eaves 1, eastern Lea County wildcat and 11 miles northeast of the Hobbs field, resumed drilling after failing to produce on swabbing test at 6420 feet.

☆ West Texas

Midland Basin Deep Test Passes Up Gas Production

High-pressure gas and distillate production temporarily passed up by Midland Basin deep prospect; prolific flow of sweet crude scored by major extensions given the Fullerton-Devonian and TXL fields; volume of wildcat operations gaining.

Midland County: Humble Oil & Refining Company's Buchanan 1, 9 miles southeast of Midland, confirmed earlier production indications in testing in excess of 1 million cubic feet of gas daily with 52-gravity distillate when tester was used at 10,315-10,388 feet. The closed in bottom-hole pressure within 10 minutes was calculated at 5200 pounds. This production is from Basal Permian, or Pennsylvanian. The test was coring lime and chert at 10,446 feet to explore the Ordovician before running pipe, carrying open hole below the 7⅝-inch seat at 8819 feet.

Humble Oil & Refining Company's Parrott 1, which attracted attention to the Upton County sector of the Midland Basin in making an oil flow from Lower

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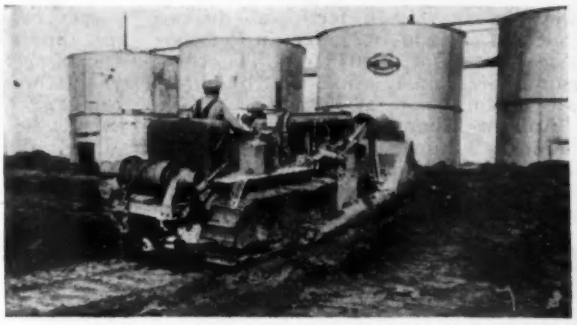

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Permian at 9550-76 feet, was drilling lime and chert at 10,255 feet in Pennsylvian, topped at 10,011 feet. The company's Gresham 1, a mile west by north, was drilling share at 7225 feet.

Andrews County: Stanolind Oil & Gas Company's University 1-P, 3 miles south by east of the Fullerton-Devonian field, flowed 221 barrels of 40-gravity oil, including 9 percent basic sediment and 2 percent wash water on a 7-hour natural test through 39/64-inch choke from Devonian perforations at 8750-70 feet. Top of Devonian was called at 8760 feet, being 339 feet low, with the oil-water contact between 8779 and 8805 feet.

Shell Oil Company and The Texas Company's Ratliff-Bedford 1, Ellenburger prospect that passed up an oil flow in the 7700-foot Permian, then showed sweet oil and gas at intervals in the Devonian from 8820 to 9160 feet, was drilling dry lime at 9260 feet. The last drill-stem test yielded sweet gas within 3½ minutes for a rated flow of 1,400,000 feet daily followed by 28 barrels of oil in the last 27 minutes of a 64-minute test at 9113-60 feet. The closed in bottom-hole pressure was 3600 pounds.

Ector County: Rowan Drilling Company's T. P. Land Trust 1, 2⅞ miles southeast of the TXL field's discovery, flowed 588 barrels of oil on a 6-hour test after flushing perforations at 7826-7915 feet with 1000 gallons of acid. A completion try was made from perforations at 7920-55 feet in the lower section of the Devonian, topped at 7826 feet, or 49 feet low, but results were negative.

Shell Oil Company's Thomas 1-A, ⅞-mile north of the discovery and a failure in the Devonian, topped at 7860 feet, being 5 feet low, tested sweet gas and oil- and gas-cut mud at 8504-60 feet and 8561-8610 feet in Silurian. It was deepening at 8620 feet to explore the Ellenburger. Phillips Petroleum Company's T. P. Land Trust-Phillips 1-A, which proved dry in the Devonian, topped at 7768 feet, or 45 feet high to the discovery, had progressed to 8460 feet.

Dual Completion: Sun Oil Company's Wheeler 1, which established the first Devonian production for the Wheeler-Ellenburger field, Winkler County, with initial flow of 371 barrels of 34.3-gravity semi-sour crude after using 2000 gallons of acid through perforations at 8540-90 feet, has been dually completed. The well flowed 577 barrels of 44.2-gravity sweet crude with gas-oil ratio of 1240/1 on natural potential test through ¼-inch choke from Ellenburger perforations at 10,560-10,600 feet. The Devonian oil shows .85 percent sulphur and .92 percent salt content, being unacceptable to Shell Pipe Line Corporation's Wheeler-Ellenburger field sweet crude outlet, which has connected to the tanks built for the Ellenburger oil, while the Devonian oil will be trucked to Shell's Goldsmith field station by Sun.

Gaines County: Shell Oil Company's Jones 2-A, southwest outpost for the Russell field and shallower pay discovery, flowed 283 barrels of 32-gravity oil, averaging 4 percent basic sediment and 1½ percent water daily on ½-inch choke after using 500 gallons of acid through Upper Clear Fork perforations at 6090-6140 feet. This well logged only about 30 feet of net pay in the regular zone between 7410 and 7775 feet. Shell's Pierson 1, 1¼ miles east of the field and the highest structurally, logged 49 feet of net pay in the upper zone at 6010-6130 feet, but is showing for a small well in the regular zone at 7282-7727 feet.

Ellenburger Projects: Stanolind Oil & Gas Company's Slaughter 1, Cochran County wildcat and 10 miles east by south of a failure in granite at 7356-7414 feet, entered the Ellenburger at 10,383 feet and tested dry at 10,456 feet. It was drilling dry dolomite at 10,495 feet to establish the water table before plugging. In Crane County, Sun Oil Company's Roberdeau 1, 1¾ miles northwest of the Crossett-Holt pool, entered the Ellenburger at 6338 feet, being 220 feet high, and was idle after testing sulphur water at 6415 feet.

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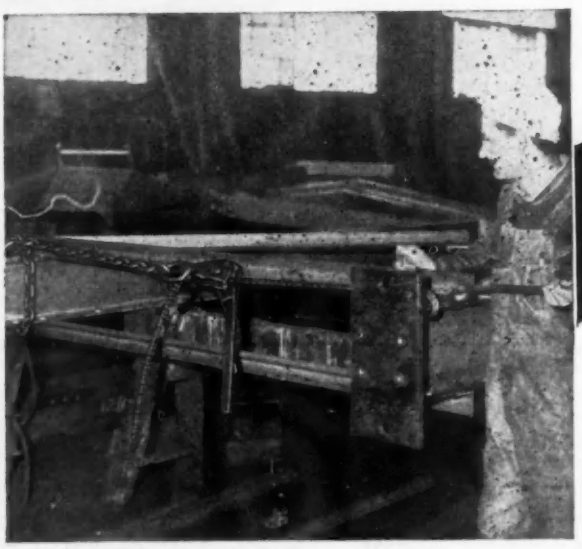

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Crockett County wildcat and 6 miles south by east of the Todd deep area, resumed drilling after testing dry in Ellenburger at 7856-85 feet.

Magnolia Petroleum Company's Ralph 1-A, a mile west of the Fullerton field, failed to complete drill-stem tests at 10,991 feet in Ellenburger, topped at 10,671 feet and was awaiting orders.

Francis A. Callery et al's Tubb-Gulf 1-B, 1½ miles southeast of Ellenburger production in the Sand Hills field, tested sulphur water in Ellenburger at 5785-5850 feet, and will attempt to complete in the 4400-foot Clear Fork, or 2900-foot McKnight.

Concho County: Northern Ordnance, Inc.'s Sorrell 1, Eliza Kempner Survey and ¼-mile north by west of City of Eden's fresh water well completion in the Hickory sand at 3867 feet, was rated at 6 to 8 million cubic feet of gas after using acid in Basal Pennsylvanian at 3294-3322 feet. The company acquired its 15,000-acre block from Floyd C. Dodson and associates, agreeing to drill 3 tests. Second project will be on the Leory Pfluger tract, Sect. 172, F. S. Millard Survey, 1½ miles northwest of Eden.

Howard Glasscock: Continental Oil Company and Group 1 Oil Corporation's Settles 1-D-133 has failed to indicate production in Ellenburger, topped at 9904 feet, and was drilling 10,040 feet. Phillips Petroleum Company's McDowell-McDow 1, 9¾ miles west by south, was drilling shale at 9380 feet on Ellenburger objective. Anderson-Prichard Oil Corporation proposes to drill a 10,000-foot Ellenburger wildcat on Standard Oil Company's Glasscock County block, centering upon T&P Ry. Sect. 28, Block 33, T-3-S.

☆ North Texas

Archer Has Prospective Strike from Bend Lime

Northern Archer County has prospective oil strike from Bend lime in old shallow pool; Grayson County wildcat unloading for test of Ellenburger; extension given Bowers field.

Archer County: Mrs. H. B. Wallace et al's Kemper 1, SW SW SE S.P. Ry. Sect. 2, A-987, offsetting depleted shallow wells and 4 miles west of Holliday, was preparing to perforate opposite saturation in Bend at 4212-31 feet. A drill-stem test indicated probable production, then the well was deepened to Ellenburger at 4615-38 feet before landing pipe at 4448 feet.

Grayson County: The Pure Oil Company's Little 1-A, Gordonville area, showed a small amount of gas while circulating after drilling plugs from 5½-inch casing at 9205 feet with the hole bottomed at 9919 feet in Ellenburger, topped at 9479 feet. However, no oil or gas had appeared in swabbing through tubing at 3000 feet from surface. Most promising oil show was logged in the Simpson, which will be tested later through perforations.

King County: The Ohio Oil Company's Ross 2, northeast offset to its Ross Ranch 5239-57-foot Strawn discovery, entered the Mississippian at 5718 feet and Ellenburger at 6075 feet without shows. The test was drilling 6280 feet to establish the water level, then plug back to complete in broken saturation at 5305-86 feet.

Clay County: Continental Oil Company's Thomas 1, wildcat and 2 miles north of Newport, was drilling dry lime at 6855 feet, having tested 60 feet of rotary mud and 160 feet of oil-cut mud when a drill-stem test was made of nominally porous zone in Simpson at 6745-55 feet. W. H. Hammon et al's Bryans 1, a mile east by south of Dean, logged nominal oil shows at 4487-99 and 4554-60 feet, and was drilling shale at 5795 feet.

Montague County: Nu-Enamel Oil Operating Company's Langford 1, MEP&P Ry. Sect. 47, scored a ½-mile southwest extension for the Bowers field in flowing 231 barrels of oil natural on 15-hour gauge through 20/64-inch choke from granite-wash and sand at 3904-16 feet.

☆ East Texas

Deep Woodbine Structure Test Considered Failure

Second wildcat on southern Houston County deep Woodbine structure considered failure; Camp County prospect coring Rodessa without shows.

Houston County: Woodley Petroleum

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Company's Murray 1, John Durst survey and 2 miles west by north of the failure that provided first evidence that the Woodbine sand extends south into the so-called Wilcox trend of the upper Gulf Coast region, was waiting orders at 8042 feet. The Woodbine was entered at 7969 feet with elevation of 170 feet, being 8 feet high. A drill-stem test at 7969-85 feet recovered 2700 feet of water-cushion and nominal show of gas. No surface pressure was recorded, while the bottom-hole pressure with tool open was calculated at 1175 pounds, or subnormal. Another test may be drilled in the area.

Camp County: M. E. Davis et al's Shelby 1, Thomas Williams survey, logged base of the Massive anhydrite at 7496 feet and was coring dry Rodessa at 8070 feet.

Henderson County: The Texas Company's Morse 1, Chandler prospect, was coring dry sandy shale at 10,635 feet in Travis Peak, topped at 10,302 feet.

Manziel Field: Amerada Petroleum Corporation's Rogers 2, northwest corner of its 50.8-acre lease, John Polk Survey, is flowing 490 barrels of 32-gravity oil on ½-inch choke from perforations at 6270-6360 feet in 7⅝-inch casing landed at 6370 feet. Solid Paluxy sand pay was logged at 6316-64 feet. This well will not be produced until Rogers 1, which is not a commercial pumper, is plugged so as to comply with spacing restrictions. Big pipe was set to prepare for a deep test, if the Paluxy failed.

Winnsboro Field: Amerada Petroleum Corporation's Gamblin 2, northeast outpost, logged the Bacon oil pay at 7890-7902 feet and the Gloyd at 8164-8200 feet, but was drilling 8275 feet for geological information before running pipe for completion.

Hunt County: The Ohio Oil Company's Popper 1, projected Smackover test, was drilling shale and anhydrite at 8605 feet in Cotton Valley, topped at 7043 feet. N. G. Landrum and R. B. Campbell will drill W. H. Adams 1, situated 330 feet from south and 799 feet from east lines of 100-acre lease, H. T. Chenowith Survey.

Cherokee County: Humble Oil & Refining Company's New Birmingham 1, offsetting depleted Woodbine oil wells in the Rusk pool, was abandoned in Travis Peak at 10,297 feet.

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☆ Southwest Texas

East Extension Opens New Sand in Boyle Field

East extension well opens new sand in Boyle field; Sun continues testing on Starr County wildcat; no shows reported in Duval County wildcat test; Argo plans deep Duval well.

Starr County: W. H. Holland of Houston opened a new producing sand for the Boyle field with the completion of Sugarland Industries 1, ½ mile east of regular Boyle production. The well flowed 200 barrels of oil per day through a 3/16-inch choke from sand at 4031-43 feet. Tubing pressure was 420 pounds and casing pressure 950 pounds.

Sun Oil Company's Cristina M. Perez 1, wildcat 13½ miles northeast of Rio Grande City in Porcion 95, was making a squeeze job after recovering oil and salt water on a drill-stem test at 4237-41 feet. Total depth is 6000 feet with 5½-inch casing set at 5735 feet.

Duval County: M. E. Davis Alliance Trust Company 1, wildcat at Realitos, recovered 3 feet of soft porous sand, no show, in a core at 4049-54 feet and now is coring below 4998 feet.

Argo Oil Corporation has staked a 6000-foot wildcat test 3 miles east of Crestonia. It is the Dionicio Garcia 1 in the Jose Marcelo Hinojosa grant.

Santa Clara Oil Company and Maguire Industries, Inc., Yates 7, Strake field, flowed 116.48 barrels on a 24-hour potential test, 3/16-inch choke, 24-gravity. Tubing pressure is 185 pounds, casing pressure 600 pounds. Total depth is 3174½ feet, and perforations were made at 3159-68 feet.

☆ Lower Texas Coast

New Production Opened by Jim Wells County Test

New production opened in Jim Wells County; Humble completes Mariposa discovery well in dual sand; Pan American testing deep sand in Willamar field; Continental gauges Kittie West discov-

ery well; Humble's Kenedy County wildcat drilling deeper.

Jim Wells County: Bridwell Oil Company has completed Ramon Garcia 1, southwest of the Ben Bolt townsite and 1 mile south of the Ben Bolt field, to open new production. On a 24-hour potential gauge the well flowed 156 barrels of 36-gravity oil through a ¼-inch choke. Casing was perforated at 4376-82 feet, tubing pressure 100 pounds, casing pressure 600 pounds, gas-oil ratio 346-1.

Brooks County: Humble Oil & Refining Company's D. J. Sullivan 1, discovery well for the Mariposa field, has been dually completed in a second sand. The well made 101 barrels of amber-colored distillate in 24 hours along with 3,200,000 cubic feet of gas through a ¼-inch choke from perforations at 7740-50 feet. Casing pressure was 2550 pounds with the gas-oil ratio 31,600-1. Previously, the well gauged 114 barrels of 40.7-gravity oil daily through a 3/32-inch choke from perforations in a lower sand at 8537½-45½ feet. The Sullivan 2 has spudded.

Willacy County: Pan American Production Company was preparing to test higher in A. B. Crane 1, Willamar field, after recovering 2300 feet of mud, 3360 feet of gas-cut mud, muddy salt water and salty mud on an 8-hour drill-stem test in perforations at 10,525-536 feet, 10,544-566 feet, and 10,588-600 feet. A previous drill-stem test at 10,640-645 feet was dry. Total depth is 12,010 feet with 7-inch casing set at 9010 feet and 5-inch casing at 10,709 feet.

Hidalgo County: Hamman Oil & Refining Company's John & George Hamman 2, wildcat 2 miles northeast of Monte Christe, has been abandoned after failing on a series of tests at 7100 feet. Total depth was 8150 feet with casing set at 7222 feet.

Live Oak County: Continental Oil Company has completed Kittie West Schriener 1, discovery well of the Kittie West field, for 46 barrels of 55.2-gravity oil daily through a ¼-inch choke from perforations at 6705-24 feet. Total depth is 7610 feet with 2-inch tubing set at 6651 feet. Tubing pressure was 2070 pounds, shut-in pressure 2490 pounds, gas-oil ratio 63,950-1.

Kenedy County: Humble Oil & Refining Company's Charles M. Armstrong 2, deep test, is drilling at 13,089 feet after running an electrical log at 12,623 feet.

Nueces County: L. M. Lockhart Ada T. Wright 2, in the Agua Dulce field, near Banquette, has been completed for 144.69 barrels of 39-gravity oil daily on an 11/64-inch choke from perforations at 5126-28½ feet. Tubing pressure was 450 pounds and casing pressure 950 pounds. Total depth is 5160 feet with 5½-inch casing set on bottom.

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Midwestern Engineers, Tulsa, Oklahoma, pipe line contractors and engineers, have been awarded contracts to install four 800-horsepower compressors in each of the Panhandle Eastern Pipeline Company's stations at Centralia, Missouri, and Pleasant Hill, Illinois, and two 1000-horsepower horizontal-type compressors at the Glenarm, Illinois, station, as well as miscellaneous auxiliary equipment at stations at Zionsville and Montezuma, Indiana.

☆ Upper Texas Coast

Daboval Field Extended By Wharton County Well

New sand extends Daboval field; oil production opened in 3500-foot sand in Kirby field; Pan American testing deep well at Pinehurst; Navarro completing new Cold Spring well; gauge reported on Brazoria discovery.

Wharton County: Amerada Petroleum Corporation's Jennie M. Smith et al has opened a new sand to extend the Daboval field ¾ mile northward. Drilled to 7317 feet, the well was plugged back and completed in perforations at 6300-09 feet for 65 barrels of 42.8-gravity oil per day through a ⅛-inch choke. Tubing pressure was 1250 pounds. This well is producing from the Middle Frio zone while other wells in the field produce from the Lower Frio and Upper Frio.

Liberty County: General Crude oil Company's C. F. Garbs 2 has opened oil production in the 3500-foot sand in the Kirby field. The new producer, south of the Garbs 1 deeper well, flowed 59.32 barrels of 22.1-gravity oil daily through a ⅛-inch choke. Tubing pressure was 285 pounds, casing pressure 350 pounds, gas-oil ratio being 360-1.

Montgomery County: Pan American Production Company's L. E. Posey 1, east of the discovery well at the Pinehurst field, recovered some gas-condensate with salt water on a drill-stem test

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in perforations at 11,085-095 feet and preparations are being made to reperforate and test higher at 11,050-086 feet.

Colorado County: Sinclair Prairie Oil Company's Felix Fehrenkamp, northeast of Rock Island, is making a squeeze job after recovering 1080 feet of gas-cut mud, 2880 feet of salt water on a 3-hour drill-stem test, ¼-inch top, ½-inch bottom chokes, in perforations at 10,948-990 feet. Five and one-half inch casing is set on bottom at 11,000 feet.

Jefferson County: Stanolind Oil & Gas Company's Gladys City 1, in the Spindletop field, was abandoned at 7560 feet.

San Jacinto County: Navarro Oil Company is swabbing Foster Lumber Company 2 into production. This well, located southwest of the discovery well at Cold Spring, perforated casing at 7863-65 feet and was swabbing oil and wash water, no salt water, and very little gas. Total depth is 7865 feet with 5½-inch casing set on bottom. On a drill-stem test the well recovered 1624 feet of 38-gravity oil, 75 feet of mud-cut oil, and 15 feet of thin mud and oil, no salt water.

Brazoria County: Glenn H. McCarthy et al's Ida Dudley Wilson et al 1, discovery well in the Blue Lake field, northwest of Angleton, has been completed on a pump for 60.78 barrels of 34.8-gravity oil daily with about 10 percent water, from perforations at 8702-14 feet. Total depth is 10,808 feet with 7-inch liner at 6522-8868 feet.

Humble Oil & Refining Company's South Texas Production Company 2, on the east flank of the Danbury dome, is drilling below 9185 feet after recovering 272 feet of mud cut with gas on a 57-minute drill stem test at 9152-62 feet. This well is deeper than the sand opened at 8074-84 feet last year.

Brazos County: Phillips Petroleum Company's Fanny Schoeps 3, 1 mile west of the Millican townsite, deepest test in the world, is still cutting and pulling stuck drill pipe. Total depth is reported to be 16,655 feet.

Chambers County: Sun Oil Company's Moore Estate 1, in the Double Gum area, bottoms at 8952 feet and 7-inch casing has been set at 8886 feet.

Harris County: The Texas Gulf Producing Company has staked an 8000-foot wildcat test 3 miles southeast of Westfield. It is the Mary L. Ingersoll et al 1 in the WCRR survey, Abstract 1423.

Service Buttons Awarded

Buttons denoting 20 years of service with The Carter Oil Company have been awarded Bonnie B. Collins and Oliver B. Goldesberry, Seminole, Oklahoma; Norman B. Masoner and Fred E. Woodruff, St. Elmo, Illinois; Roy W. James, Henderson, Kentucky; Garland W. Hudson and William A. Watkins, Tulsa, Oklahoma, and Willard R. Scott, Mattoon, Illinois.

☆ South Louisiana

South Bayou Mallet Area Has Wildcat Discovery

Wildcat discovery in South Bayou Mallet area, Acadia Parish; new production on northwest flank of Napoleonville dome, Assumption Parish; dual sand completion seen in West Tepetate field, Jefferson Davis Parish; deep tests planned in Beauregard Parish.

Acadia Parish: Union Sulphur Company's Marvine Kahn 1 apparently is opening new oil production in the South Bayou Mallet area. With total depth of 10,320 feet and 5-inch liner set to 9840 feet, perforations were made at 9610-18 feet and on 1-hour drill-stem test, using ¼-inch bottom and ⅛inch top chokes, with 2000-foot water cushion, packer set at 9582 feet, it showed a maximum of 1500 pounds working pressure and flowed at the rate of 195 barrels of 33.1-gravity oil per day. However, at the end of the test it was showing 60 percent water, believed to be coming from a lower sand. A squeeze job was being made to shut off the water. Oil sand was reported at 9610-15 feet and gas sand at 9784-95 feet.

Assumption Parish: Shell Oil Company's Dugas-LeBlanc 1-A has been completed to open production on the northwest flank of the Napoleonville dome. With pipe perforated at 6858-63 feet, the well flowed a potential of 212 barrels daily through a ⅛-inch choke. Tubing pressure was 1205 pounds, gravity 39.7 and gas-oil ratio 755-1. Oil sand was reported at 6858-93 feet, and another sand showing oil was reported at 6812-40 feet. The new production is 3½ miles west of the east flank production on the opposite side of the dome.

Jefferson Davis Parish: Barnsdall Oil Company et al's Minos Miller 3, West Tepetate field, was being completed in the original Miller discovery sand after opening a new sand at 8400 feet. With perforations at 8523-32 feet, the well flowed at the rate of 628 barrels of 36-gravity oil on a 15½-hour test through ¼-inch chokes, top and bottom. Flowing pressure on tubing was 1040 pounds and

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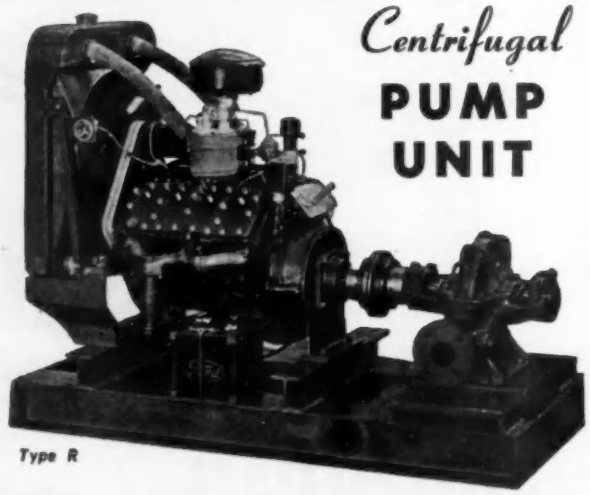

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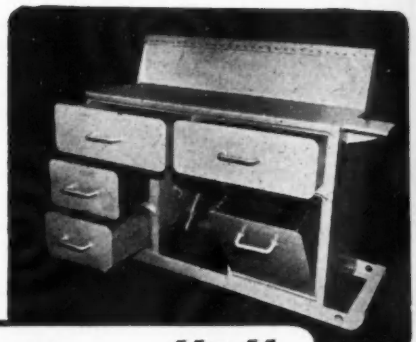

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the gas-oil ratio was 840-1. The well now is cleaning into pits. Previously, the well flowed 600 barrels daily on a drill-stem test in a higher sand at 8400-08 feet. A dual completion may be attempted. The Minos Miller 5 has 7-inch casing set on bottom at 9322 feet and will complete in the deep sand at 9150 feet.

Stanolind Oil & Gas Company's W. H. Tupper 1, at South Elton, was completed for 237 barrels daily through 10/64-inch choke from perforations at 8064-74 feet. Tubing pressure was 2200 pounds and casing pressure 2325 pounds. Gravity was 38 with .2 percent of the flow being water. Total depth is 9225 feet with 7-inch casing set to 9254 feet.

Beauregard Parish: Magnolia Petroleum Company has staked for a 13,000-foot wildcat test in the Bancroft area. It is the Lutcher-Moore 1-D. In the Oretta area, Magnolia made location for Musser-Davis 1-B, a 10,000-foot test.

☆North Louisiana

Six Completions Noted; Rain Hampers Operations

Six completions announced for week; 4 locations staked, 1 a wildcat; operations slowed by heavy rains and high water.

Madison Parish: Woodley Petroleum Company's Montgomery 1, 14-15-9e, a wildcat was abandoned at 6006 feet, ending all drilling activity in that parish.

Richland Parish: Murphy-Sun Oil Company completed Ella M. Barrier 3, 22-17-9e, Delhi field, with production gauged at 260 barrels of 41.5-gravity oil daily from perforations at 3358-68 feet through 3/16-inch choke. Total depth is 3496 feet. Gas-oil ratio is 395-1. R. T. Sellars is reported on location at newly staked Henry Abrams 1, 3630 feet south and 680 feet east of the northwest corner in 26-17-9e. The wildcats of this area are George Schoonmaker et al drilling below 3500 feet at Gold Mine 1, 10-14-6e, and R. W. Williams nearing 3000 feet at Stone 1, 30-17-17.

Tensas Parish: Stanolind Oil and Gas Company's R. D. Shelley 3, 30-11-10e, Holly Ridge field, was gauged at 288 barrels of 37.8-gravity oil daily through 10/64-inch choke from perforations at 8366-88 feet. Gas-oil ratio is 570-1. The Carter Oil Company was drilling at 7130 feet at Butts 1, wildcat in 14-10-10. The other wildcat of this parish, Shamrock Oil and Gas Corporation's Panola Company, Ltd. 1, 34-13-12e, has set 13⅜-inch casing at 268 feet and was reported drilling below 500 feet.

Union Parish: Carbon Consolidated Company's McCormick 1, 23-22-3e, was completed with gas volume measured at 4,907,000 cubic feet of gas per day. No gauge was taken prior to acidization. Pressure was 960 pounds, total depth 2212 feet.

Interstate Natural Gas Company is reported to have logged showings of oil indicating commercial production in the Cotton Valley series below 9410 feet, in Fee 163, 35-21n-3e, a deep test in the Monroe gas field. The report, as yet unsubstantiated, indicated that line marker was topped around 9355-65 feet, and that cores showed oil. The James was logged at 2786 and Travis Peak at 3420 feet.

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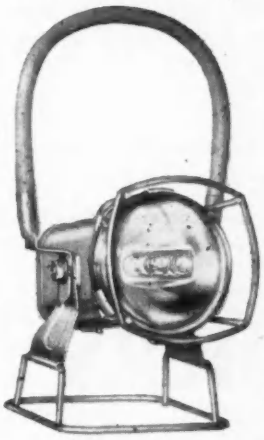

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Franklin Parish: American Liberty Oil Company completed J. B. Kny 1, 12-16-8e, as a gasser. Gas volume was gauged at 2,100,000 cubic feet per day with pressure at 1519 pounds. Total depth of the well is 3772 feet.

Caldwell Parish: This parish received the only wildcat staked during this week, Shell Oil Company's Louisiana Central Oil and Gas Company 2, 2277 feet south and 1507 feet east of the northwest corner of 36-15-2e. The company is reported on location. The Atlantic Refining Company has shut down for repairs at Tremont Lumber Company 1, 6-13-2e. Total depth is 6500 feet. Shell Oil Company is waiting on cement at Louisiana Central Lumber Company 1, 31-15-3e.

De Soto Parish: Oakes-Easton and Logan completed Ramsey 2, 22-16-13, as a pumper without an estimate of the flow. The well began testing early in March. W. I. Nowling was starting work on Boone 1, 25-11-11. The well is to be taken to 3500 feet on a 40-acre tract.

Caddo Parish: John A. Economo's Glassell-North 1, 26-20-15, formerly owned by R. L. Corley, was abandoned following testing at various intervals since September with no shows reported. Depth of the well was taken to 2820 feet. Phillips Petroleum Company was rigging up Leake 1, 32-19-16, in the new Longwood field.

Bossier Parish: Barnsdall Oil Company reports drill pipe stuck at 6834 feet at Welori Lumber Company 1, 20-20-12. Vaughn and Hurley's Ellerbe is below 8800 feet, which is below Barnsdall's Hanks 1, gas-distillate well, producing from the Cotton Valley.

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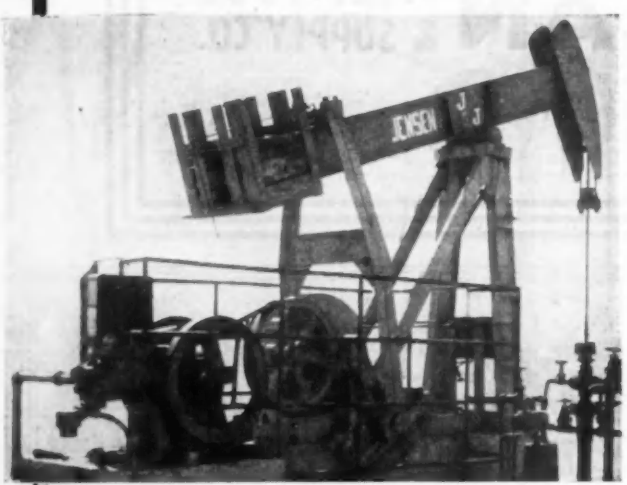

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☆ Arkansas

Two Macedonia Area Wells Are Due for Completion

Two Macedonia area wells due for completion; 3 locations announced.

Columbia County: Placid Oil Company's Whitlow-Groves Unit 1, 100 feet north of C N½ NW 28-18-21, tested 75 percent oil after second perforations at 6812-24 feet in Cotton Valley. Total depth is 8446 feet. Phillips Petroleum Company's Cloette 1 was below 8835 feet. Bradham and Ragsdale's Booth Unit 1, 14-17-19, reported by error to have been abandoned, was preparing to test at 7396 feet, deep for production in that field. It is in a section where several wells are producing. G. H. Vaughn's J. F. Smart C-4, SW SE SE 12-15-20, has reached 3922 feet and was reported preparing to perforate. T. W. Lee is to drill J. I. Thompson 1, C SE NW SW 14-15-20w, Stephens field. McAlester Fuel Company is to drill Couch-Staggs 1, C NW SW 11-16-20.

Miller County: Skelly Oil Company ran another test of the Texarkana National Bank 1, with perforations at 5327-37. Three thousand five hundred feet of salt water and mud were recovered on drill-stem test. Plug was set at 5160 feet. The Carter Oil Company's Sturgis A-14, in 1-17-27, was swabbing 30 barrels of oil per hour through open hole from 3662-91 feet.

Union County: In the Hillsboro field, Hickey and Wallingford's M. L. Sumners 4, 13-18-14, pumped at a rate of 25 barrels of oil per day and 3 barrels of salt water. The well has been shut in.

Wildcats: Curtis Kinard was moving in rig for T. C. Deal 1, C NW SE 29-11-7. The well permit was first taken out by A. E. McKiernan et al. G. H. Vaughn's McKissack 1, C SE NE 18-16-21, has set 16-inch casing at 100 feet and 10¾-inch at 1882 and was drilling near 2000 feet. Tidewater Associated Oil Company set 9⅝-inch casing at 3209 feet at the Grace Griffin 1, NW SE 33-18-16, Union County.

☆ Southeastern

Gwinville Field Offset Shows Promise on Test

Once-promising Issaquena test abandoned; Gwinville field offset may be important; Marion County extension staked; 3 wildcat tests planned in Rankin County.

Adams County: Humble Oil & Refining Company's Ida Stowers 2, 35-9n-2w, was drilling in shale at 4684 feet with no shows reported.

Claiborne County: The Pure Oil Company's A. L. Chapman 1, 13-11n-3e, which is seeking production to the 10,500-foot level, is drilling below 5950 feet in hard shale.

Greene County: Humble Oil & Refining Company's Harry Stover 1, 20-3n-7w, is drilling below 5464 feet in chalk and shale. Some importance is attached to this test as the Byrd Dome is believed to be of Piercement type.

Issaquena County: The California

Company's Mississippi Alluvial Farms 1, 34-12n-8w, which had been considered one of the state's best prospects, has been abandoned as dry. Slight shows of oil were first reported at 3100 feet and later from cores taken in the Smackover lime, but the well started making salt water and was abandoned at 9237 feet.

Jones County: Ginther, Warren & Ginther's Mrs. Florence Mitchell 1, 23-6n-12w, was drilling at 8705 feet in the Massive sands, No shows have been reported in cores taken in the Tuscaloosa section, and the well will be drilled to about 8770 feet, electrical log run, and probably abandoned. Gulf Refining Company's D. J. Flynt 1, 35-9n-12w, has encountered abnormal salt thickening suggestive of a steep dip. Better indication of this may be shown by an electrical log which will be run within the next 250 feet. Roads have been completed to Gulf Refining Company's new wildcat, Davis Grayson 1, SW NE SE 18-9n-13w. Scheduled for a Tuscaloosa test, the well brings the list of Gulf's wildcats to a total of 4 within a 7-mile radius.

Jeff Davis County: Gulf Refining Company's V. G. Gholar 1, 27-9n-19w, north offset to the high-gravity oil discovery in the Gwinville field, has been cored continuously from 7905 feet to its present depth of 8605 feet and approximately 185 feet of productive sand is indicated, of which 35 to 40 feet is oil. A drill-stem test with packer at 8557 feet was taken at 8565 feet and 3690 feet of clean 45.2-gravity oil was recovered in 20 minutes, ¼-inch top and bottom choke. A drill-stem test was taken at 8597-8605 feet which flowed gas and recovered about 1 gallon of amber-colored condensate on 10-minute test. Coring will continue below 8605 feet. An estimated 10,000 proven acres of oil and gas production is indicated at the present stage of development in Gwinville, and there is evidence that it may become much greater.

Madison County: The Carter Oil Company's Anderson-Wicker 1, 10-11n-3e in the Pickens field, recovered 135 feet of oil with 8 feet of salt water in a drill-stem test at 4882-92 feet, ¼-inch top and bottom choke open 13 minutes. Five one-half-inch casing was run to 4880 feet and cemented.

Marion County: The California Company has staked Walker 1, NE NE 10-2n-18w, Hub field. The new location is about ½ mile northeast of the discovery well, Humble Oil & Refining Company's Evans 1.

Rankin County: Three new wildcat tests were about to get under way several miles southeast of Jackson. George W. Lyles' L. L. Billings 1, 11-4n-1e, was preparing to spud, and Atlas Oil & Refining Company's Freida Burnham 1, 24-3n-5e, was waiting on rig. Carter's Dewey D. Swor 1, 15-4n-5e, is scheduled for an 8000-foot test.

Smith County: Gulf Refining Company's E. G. King 1, 8-10n-13w, on the south flank of the New Home dome, has cored to 8302 feet with no shows and run electrical log to that depth. Orders for abandonment are expected.

Wayne County: Gulf's Lillie M. Johnston 1, 34-10n-9w, northwest extension attempt in the Eucutta field, has been abandoned at 5425 feet in the Stanley sand zone. Salt water occurred in all sands cored from 5218 feet to 5425 feet.

Alabama

Hunt Oil Company's W. J. Trice 5, 34-11n-4w, in the Gilbertown field of Choctaw County, has been abandoned at 3690 feet. Cores taken at 2615 feet in the Eutaw horizon had shows of heavy oil and salt water.

At Gilbertown, W. O. Woodward's Mary Green 2, 31-11n-4w, swabbed dry after perforating at 3520-27 feet with 24 shots. Well is waiting on workover rig.

Repairing the steam engine of Central Electric Power & Treating Plant has held up production tests on 5 H. L. Hunt wells. The wells are pumping through the treating plant. Three wells completed in the eastern part of the Gilbertown field are waiting on power which will be produced through this plant.

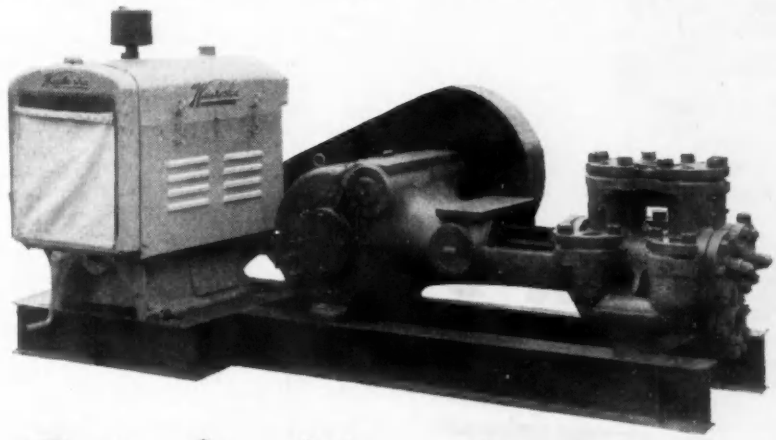
Walker County: Glen D. Rose Oil & Gas Company's Ulysses 1, C N½ NW SE 6-13s-6w, has picked up the top of the Bangor section at 1070 feet and is drilling below 1085 feet.

Fayette County: W. M. Dalton's Morris White 1, C NW SE NE 21-16s-11w, was drilling at 675 feet.

Sumter County: H. H. Hamilton was rigging up rotary at Allison Lumber Company, wildcat in C SE SW 3619s-4w.

Florida

Humble Oil & Refining Company's Gulf Coast Realty Company 4, 20-48s-30e, deep test in the Sunniland field of Collier County, is drilling below 11,240 feet in anhydrite, shale and lime with no



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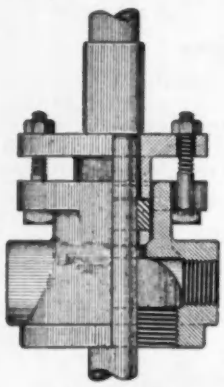

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C. N. Hilton, President, Hilton Hotels.

shows reported. In Highlands County, Humble's wildcat, G. C. Carleton Estate 1, 34-38s-29e, is drilling below 5656 feet in shale.

Monroe County: O. D. Robinson's State 1, 29-59s-40e, is drilling below 2510 feet in lime, using salt water, with intermittent returns.

Gulf County: The Pure Oil Company's Kate Gaskin 1, NE NW 19-5s-9w, a deep wildcat test, has spudded, set 20-inch conductor pipe, and was waiting on cement at 100 feet.

Bay County: Magnolia Petroleum Company was preparing to move in at State 4-B, C SW SW 21-3s-15w.

Charlotte County: Humble has rigging up for its newest wildcat, Lownes-Treadwell 1, C SW NE 17-42s-23e.

Georgia

In Echols County, Hunt Oil Company has completed drilling Superior Pine Products Company 2, Land Lot 317, Land District 13, at 4500 feet, and was running electrical survey.

Toombs County: Tropic Oil Company's Gibson 1, 4½ miles southwest of Lyons, is drilling below 2935 feet. Electrical log was run to 2310 feet, and 9 sidewall cores taken from 1869 to 2281 feet, but no shows were recovered.

☆ Illinois Basin

Rain Slows Operations; Coles Test Near Pay Zone

A week of heavy rains again slowed Illinois basin operations; roads in most sections impassable and both the Ohio and Wabash Rivers were still out of their banks in many places; not a single discovery registered in the 3 states.

Coles County: Kuehne Manufacturing Company's Fee 1, SE NE 23-12n-7e, wildcat ½ mile north of production in the Mattoon pool, was nearing potential pay zones with the drill below 1700 feet. A strike would expand the growing pool and set the stage for drilling within the city limits of Mattoon since the Kuehne well is only a few feet outside the south limit of the city.

Wayne County: Best completion in several weeks is Dee Miller's Weaver 2, SW SW NW 9-1s-6e, which flowed 1753 barrels of oil in 24 hours from McClosky lime. On latest gauge it flowed 1400 barrels daily.

Jefferson County: The Texas Company is drilling below 2500 feet at Eubanks 1, SW NW SE 35-2s-1e, in the Woodlawn pool, for a test of Devonian lime. A commercial producer in the Devonian would bring about a widespread deepening campaign in the field which now produces from the Benoist and Aux Vases sand.

Marion County: Magnolia Petroleum Company has staked Robinson 1, NW SE NW 10-2n-4e, 10 miles due east of Salem and 5 miles from production.

Washington County: Harry Hubbard and others' Doolin 1, SE SE SE 25-3s-5w, was shut down awaiting orders at 2412 feet. A wildcat test, the well apparently was dry in Devonian lime break at 2340-45 feet.

Jasper County: Sun Oil Company's Yost 1, NE SW SE 7-5n-14w, a wildcat, is drilling below 1200 feet.

☆ Rocky Mountain Area

Well in South Elk Basin Cores Saturated Sand

South Elk Basin discovery continues coring saturated Tensleep sand; first failure found on east side of Elk Basin field; Powder Wash has good producer; Rangely field looks big with 2 extension wells near completion.

Wyoming

Continental Oil Company's Goodstein 1, new discovery 3 miles south of the Elk Basin field, has cored more than 120 feet of saturation in the Tensleep sand, entered at 6961 feet, and is coring at 7085 feet. Three drill-stem tests have proven the section. The last, from 7024-7061 feet, recovered 1170 feet of oil and 270 feet of oil-cut mud in 21 minutes.

First failure on the east flank of Elk Basin is MacKinnie Oil & Drilling's N. P. 12, NE NW SE 5-57n-99w. The well drilled through into a deep fault zone and was abandoned at 5975 feet without encountering the Tensleep pay. MacKinnie's N. P. 5, NE SW NW 5-57n-99w, was being completed at 924 barrels per day in the base of the Tensleep at 4956 feet, while N. P. 6, NE SE SW 557n-99w, was running tubing for completion tests. Seven-inch casing is at 5240 feet, total depth 5400 feet.

Oil Mountain: The Texas Company has a new discovery that swabbed 17 barrels of heavy black oil of 12.4-gravity and a small amount of water. Pumping equipment was being installed. The well was drilled to the Deadwood, entered at 3405 feet, and tested water and was plugged back to the upper Tensleep at 2668 feet. The Tensleep was saturated from 2640-2795 feet with the lower portion carrying water.

Badger Basin Field: General Petroleum's Resolute 7, C NW SW 8-57n-101w, north of Cody, is bottomed at 8492 feet and was running tubing to swab test saturation found in the Frontier sands that cored some saturation from 8140-8150 and 8260-8286 feet. Surface elevation is 4178 feet and saturation is reported higher than any other well in the field. An offset location has been made for Resolute 8, 40 acres west, where drilling may be carried to the untested Tensleep sand estimated to be more than 11,000 feet deep.

Fremont County: The Carter Oil CompanyKerlyn Oil Company's Indian Lands 1, NE NE 16-5n-2w, Sheldon Dome, is troubled with a duplicated fractured section on its way to the Tensleep after finding a small amount of 34-gravity oil in the Dinwoodie from 6265-6280 feet and 6310-6330 feet. It is coring in limestone at 6450 feet.

At Steamboat Springs British American Oil Company has cleared location for an extreme north outpost test of the structure in its Tribal Lease-C 6, NW NW SE 19-4n-1w, 2 miles from production. Tribal Lease-C 5, NE NW SW 32-4n-1w, made a drill-stem test from 5285-5310 feet, open 1 hour, and recovered 900 feet of oil and 190 feet of oil-cut mud. This satisfactory test lends encouragement toward the outpost prospect.

Carbon County: The Texas Company is building roads to James 1, C SE SE

35-13n-92w, and material soon will be moved in for a wildcat test of the Baggs Anticline, near the Colorado line. Texas has also taken over the Tri-State, Inc., properties at Black Mountain in Hot Springs County in a deal just completed that calls for a deep test.

Colorado

Two extension tests at Rangely field in Rio Blanco County have reached the Weber pay. Stanolind Oil and Gas Company's Rector 1, C NE SE 34-2n-102w, entered the Weber at 6524 feet and 7-inch casing was being set at 5629 feet. This well in the southeast part of the field is running around 80 feet higher than expected. In the northwestern portion of the field Husky's Hagood 1, C NE SE 23-2n-103w, was being completed at a total depth of 6555 feet, where oil is flowing by heads from open hole in the Weber sand from 5965-6555 feet.

Powder Wash: Mountain Fuel Supply Company's Hal Stewart 3, SE NE NE 32-12n-97w, is completed for 500 barrels daily from a sand zone in the basal Wasatch formation, with casing perforations above 4886 feet after plugging back from 5402 feet. Several other zones testing oil and gas remain cased off. Mountain Fuel is rigging up a new outpost ½ mile east of the Hal Stewart 3, being their Carl Allen 3, SE SE NW 33-12n-97w.

Montana

Stanolind has 2 interesting wildcat tests, with 1 rigging up in southern Montana. Perhaps the most important is N. P. 1, SE SW NW 27-2s-50e, in the Powder River Basin, where contractors are prepared for a deep test in a large new area. The second test is in the Big timber area, L. J. Rapstad 1, SE SE SW 31- 2n-15e, in Sweetgrass County.

Thorpe & Walker have staked a wildcat in the Dunkirk area for O'Laughlin 1, SW SW NW 3-31n-1w, in Toole County, southeast of Shelby, Montana.

☆Michigan

Mecosta County Wildcat Reveals Much Promise

Smith Petroleum Company's Ortwein 1, SE NW NE, 7-14n-7w, Wheatland Township, Mecosta County, logged Dundee lime at 3684 feet and pay at 3685 feet where drilling was suspended to set 5½-inch casing. The well filled up 1100 feet in 1 hour and flowed 70 barrels of oil after standing 28 hours.

Operators see the wildcat as the best field prospect this year.

Saginaw County: Shell Oil Company will perforate and acidize Dundee lime at 3033-88 feet on Nelson 1, NW NW NE 13-11n-2e, Fremont Township. Cores showed porosity and some oil saturation but on drill-stem test showed no results.

Ogemaw County: Muskegon Development Company's State A-3, NW NE NW 29-24n-2e, completed at 2059 feet last fall for a new horizon oil discovery in Rose City pool, has been deepened to Dundee without results and now will be carried to 4200-foot Richfield section. Initially in Traverse lime the well flowed 250 barrels per day but production had fallen to a non-commercial point. Dundee, logged at 2809 feet, did not show to water zone at 2947 feet.

Oklahoma Operators Form Salt Water Disposal Group

Operators in the West Edmond pool of Central Oklahoma have organized a salt water disposal group and have applied to the Oklahoma State Corporation Commission for permission to utilize a dry hole drilled by Sohio Petroleum Company in CNE NE 12-13n-5w, Canadian County, as an input well. This hole was drilled to 7228 feet and failed to produce in the Hunton. Under the proposal Sinclair Prairie Oil Company will act as the operator. Hearing on the application has been set for April 10.

At the same time the commission granted an extension on the hearing of application by six West Edmond oil producing companies to cut down the present 150 barrels daily per well allowable in order to conserve bottom-hole pressure in the field which is being dissipated at the rate of a pound a day. The hearing, set for April 5, has been postponed until April 24.

Louisiana Hearing

Public hearing will be held at the Monteleone Hotel, New Orleans, April 12 to take evidence preparatory to setting oil and gas allowables for New Orleans for the 61-day period of May and June.

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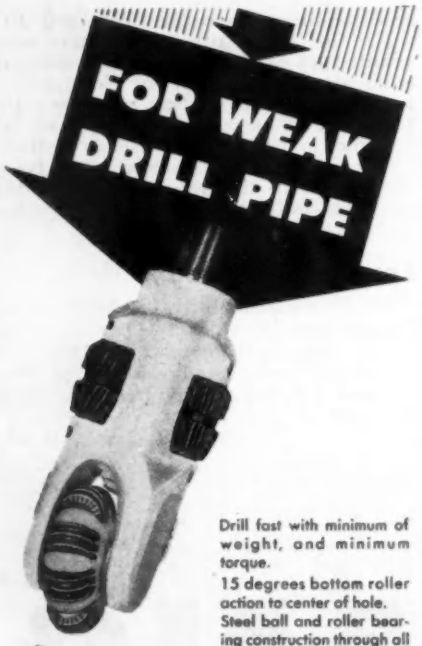

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☆ California

Deep Oil Sand Apparently Found in Lost Hills Area

Standard Oil Company of California apparently finds deep oil sand at Lost Hills in Kern County; Shell drilling below 12,425 feet in Los Angeles County; deeper oil sand found at Newhall-Protrero.

Los Angeles County: Shell Oil Company's Reyes 135 at Dominguez cemented 7000 feet of 10¾-inch casing and was drilling below 12,425 feet, making only about 20 feet a day, changing bits each 24 hours. It was drilling in sand and shale at last report. The same company is drilling 2 deep tests at Long Beach, 1 at about 12,000 feet and the other close to 11,000 feet.

Barnsdall Oil Company's R.S.F. 44 at Newhall-Potrero has proved a sixth producing sand and the well flowed better than 700 barrels of 36-gravity clean oil on test, through 12/64-inch choke. The hole was drilled to 11,229 feet and a string of 7-inch casing was landed at 11,100 feet. Production is from 9668-9802 feet, perforated at intervals.

Kern County: Standard's Cahn 58-4 at Lost Hills has cored a good oil sand at 8750-8768 feet, total depth 8770 feet. The electric log indicated the oil sand was topped at 8650 feet. The completion of a commercial producer by this test will bring further drilling in this old and shallow field. The drilling is very difficult due to extreme water pressures and previous efforts to case off water had failed several times.

☆ Canada

Conrad Area Discovery Well Given Pumping Test

Conrad area discovery given pumping test; wildcat planned near Princess well; Saskatchewan has first commercial well.

Mid-Continent Oil & Gas and East Crest Oil Company's 1, lsd 2 8-6-15w4, discovery well of an Ellis sand oil pool, began experimental pumping tests March 30. The yield during first 4 days ranged between 200 and 340 barrels per day of 27-gravity oil. The well appears to be the best sand producer yet completed in Alberta.

The discovery well, completed at 3158 feet after topping Ellis sand at 3152 feet, flowed at 75 barrels daily through 2½-inch tubing before going on pump. Indicated potential is 250 to 300 barrels daily.

Mid-Continent-East Crest 2, offsetting the discovery to the north, was expected to complete drilling this week. This team will follow up immediately with east and northeast offsets, while Standard Company of California is expected to offset the strike to the south.

Princess Area: Four independent companies and an unnamed major group have subscribed funds for immediate drilling of an important wildcat 11 miles northwest of the Devonian Dolomite discovery well. The well, Toronto Syndicate 1, lsd 1 6-22-13w4, was slated to spud this week. Backers include South Brazeau Petroleums Ltd., Pacalta Oils Company Ltd., Homestead Oil & Gas Ltd., New Ranchmen's Oil Company Ltd., and the major group (presumed to be Standard). All these groups hold substantial acreage in the area.

Saskatchewan: The province has its first apparently commercial well. The well, National-Grant 1, lsd 4 14-49-28w3, was placed on pump and averaged 45 barrels daily of 14-gravity oil. Drilling was completed in November at 1872 feet after topping the Lloydminster oil sand (Lower Cretaceous) at 1870 feet. The well is 1000 feet east of the Alberta-Saskatchewan border, and is ¾ mile east of the Silverdale 1, south extension producer in the Alberta Lloydminster field.

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EXPLORATORY COMPLETIONS

CALIFORNIA WILDCAT

Kern County—Failure: Richfield Oil's Lerdo 1-28-26, Premier area, Chanac 3153 ft, abnd 3400 ft.

ILLINOIS WILDCATS

Clay County—Failures: Harvey H. Sims' Murvin 1, se se se 11-5n-7e, abnd 2976 ft.

Magnolia's Cammon 1, ne se ne 16-4n-7e, abnd 3058 ft.

Edwards County—Discovery: Aetna Oil Co.'s Greathouse 1, sw ne nw 23-1n-10e, O'Hara 3244-55 ft, pump 80 bbls, td 3320 ft.

Jefferson County—Failure: E. J. Ruwaldt's Sherman 1, ne sw se 6-3s-1e, abnd 2390 ft.

White County — Failure: E. E. Beatty's Gooch 1, se se nw 35-3s-8e, abnd 3585 ft.

INDIANA WILDCATS

Dubois County — Failure: H. R. Burton's Kidwell 1, sw ne sw 1-3n-5w, abnd 510 ft.

Joseph County — Failure: M. C. Pletcher's Floss 1, sw nw 33-38n-4e, abnd 551 ft.

Posey County — Discovery: Bristol Hackbush's Goede 1, ne ne sw 24-5s-12w, Cyp 2368-74 ft, pump 10 bbls, td 2820 ft.

KANSAS WILDCATS

Barber County—Failure: Alladin Pet. Corp.'s Hastings 1, c e½ se ne 31-30s-14w, Miss 4364 ft, Arb 4544 ft, abnd 4575 ft.

Graham County—Oil Discovery: Wood River Oil Co.'s Faulkner 1, sw se se 27-10s-22w, Lans lm 3629-33 ft, pot 406 bbls oil, td 4100 ft.

Pratt County—Failure: Amerada's Drews 1, sec nw 3-27s-12w, Simp 4491 ft, Arb 4601 ft, abnd 4634 ft.

Rooks County — Failure: Royer & Farris' Baldwin 1, nwc 9-10s-19w, Lans 3438 ft, Arb 3767 ft, abnd 3784 ft.

KENTUCKY WILDCATS

Henderson County—Failure: Ashland O&R Co.'s Powell 1, 14-P-21, abnd 2854 ft.

Nelson County—Failure: Nelson O&G Co.'s Cripps 1, 16-Q-48, abnd 1470 ft.

NORTH LOUISIANA WILDCATS

Bienville Parish — Failure: T. L. James' Southern Paper Bag Co. 1, nw 23-17n-7w, elev 305 ft, Base Anona 2610 ft, Blossom 2826 ft, Tuscaloosa 2680 ft, anhy 5080 ft, massive anhy 5355-76 ft, Rodessa 2876 ft, abnd 6335 ft.

Franklin Parish—Gas Discovery: American Liberty Oil Co.'s J. B. Kny 1, elev 95 ft, Gas rock 3200 ft, Tuscaloosa 3250 ft, red shale 3415 ft, Paluxy 3503 ft, perf 18 shots 2557-62 ft, flow est 3 mln gas, ¼-in, cp 900 lbs, tp 900 lbs, td 3772 ft.

Madison Parish—Failure: Woodley Pet. Co.'s Montgomery 1, c nw se 14-15n-9e, elev 78 ft, Tuscaloosa 4668 ft, massive 5273-95 ft, Comanche 5408 ft, Paluxy 5445 ft, flow 3-4 mln gas on 20-min dst 5282-92 ft, operator abnd as not sufficient for commercial prod 6006 ft.

Natchitoches Parish—Failure: E. H. Demitrio's Prudential Life 1, w of c 23-10n-9w, elev 125 ft, temp abnd 1782 ft.

SOUTH LOUISIANA WILDCATS

Assumption Parish—Oil Discovery: Shell's Dugas & Leblanc 1-A, 940 s 00° 30 mins w 440 s 88° 59 mins w fr nec 40-12s-13e, Napoleonville area, sand 6858-93 ft, perf 20 shots 6858-63 ft, flow 212 bbls 39.7-gr, ¼-in, tp 1205 lbs, td 7405 ft.

Jeff Davis Parish—S. Elton Oil Discovery: Stanolind's W. H. Tupper 1, 1320 n 2640 w of sec 29-7s-3w, sand 8064-85 ft, flow 237 bbls 38-gr oil, 0.2% wtr, 10/64-in, gor 2300/1, tp 2200 lbs, cp 2325 lbs, td 9255 ft.

MICHIGAN WILDCATS

Huron County—Dwight Oil Field Discovery: C. W. Teater's Ignash 1, se se se 21-18n-13e, Dundee 2315 ft, Monroe 2850 ft, flow & swab 15 bbls, td 2878 ft.

Kent County—Failure: Michigan Devonian Pet. Co.'s Arnold 1, sw nw nw 17-5n-12w, abnd 1790 ft.

Muskegon County—Failure: Muskegon Dev. Co.'s Proctor 1, se sw nw 3-12n-15w, abnd 2035 ft.

Oceana County—Failures: Fisher-McCall Oil Co.'s Smith 1, nw nw ne 8-16n-16w, Traverse 1718 ft, abnd 1742 ft.

Sinclair Wyoming's Newman 1, se se ne 7-13n-16w, Dundee 2410 ft, abnd 3500 ft.

Ogemaw County—Failure: Arenac O&G Co.'s State 1, w½ sw 15-24n-4e, Berea 1890 ft, abnd 1959 ft.

Roscommon County — Failures: E. V. Hilliard's Wraco 1, nw ne nw 11-21n-4w, Dundee 3939 ft, abnd 4035 ft.

Sun's St. Helen C-2, s½ ne sw 27-22n-2w, Richfield 5130 ft, abnd 5285 ft.

MISSISSIPPI WILDCATS

Issaquena County—Failure: California Co.'s Mississippi Alluvial Farms 1, 666 ft s 666 ft w nec se 34-12n-8w, elev 108 ft, abnd 9237 ft.

Leake County—Failure: Harold K. Boysen's Denkman Lbr. Co. 1, c sw sw 8-11n-9e, elev 481 ft, abnd 4826 ft.

NEW MEXICO WILDCATS

Colfax County—Failure: Cates & Sidwell et al's Sauble 1-A, sw se sw 35-27n-24e, abnd 2525 ft.

Eddy County—Failure: Forrest H. Lindsay et al's Lee 1, nw ne sw 12-19s-26e, elev 3289 ft, Red sand 620 ft, San Andres 1406 ft, abnd 2002 ft.

NEW MEXICO OUTPOST

Lea County — Cap Rock Field Extension: Geo. P. Livermore, Inc.'s Williams 1, c nw ne 7-13s-32e, 1¾ mi s of fld, elev 4381 ft, anhy 1420 ft, salt 1540-2150 ft, Yates 2220 ft, Red sand (Queen) 3045 ft, pump 12 bbls, shot 60 qts nitro 3044-59 ft, td 3064 ft.

OKLAHOMA WILDCATS

Cleveland County—Oil Discovery: Magnolia's Anneler 1, sw ne 26-6n-1w, Bartlesville sd perf 42 shots 6075-83 ft, pump 105 bbls, td 7035 ft.

Garvin County — Failures: C. L. Carlock's Blythe 1, nw nw nw 29-1n-1e, abnd 5306 ft.

Continental's Kennebrew 1, ne ne nw 27-3n-1e, Bro sd 3398 ft, abnd 3674 ft.

Hughes County—Failure: Wilcox Oil Co.'s Rogers 1, sw nw se 28-9n-9e, Bartlesville sd 2270 ft, abnd 3510 ft.

WEST TEXAS WILDCATS

Cochran County — Failure: Helmerich & Payne's Wright 1-A, 660 ft out swc lab 14, Lge 98, Brewster CSL sur, elev 3760 ft anhydrite 2250 ft, salt 2315 ft, San Andres 4000 ft, Glorietta 5500 ft, Clear Fork 6005 ft, abnd 6513 ft.

Glasscock County — Failure: Seaboard Oil Co.-Shamrock O&G Corp.'s Calverly 1, c ne sw T&P Ry. 38, blk 35, T-3-S, elev 2734 ft, anhy 1260 ft, Yates 1986 ft, lime 2980 ft, Clear Fork 4800 ft, abnd 5020 ft.

Mitchell County—Failure: Warren Pet. Co.'s Jones 1, 467 ft out sec H&TC Ry. 9, blk 26, elev 2281 ft, anhy 700 ft, Yates 1020 ft, San Andres 2023 ft, Clear Fork 2970 ft, abnd 5512 ft.

WEST CENTRAL TEXAS WILDCATS

Callahan County—Failure: C. B. Holmes et al's Jackson 1, 150 ft snl 1800 ft wel T&NO Ry. sec 1, elev 1851 ft, abnd 825 ft.

Jones County — Oil Discovery: Primo Oil Co.'s Martin 1, 330 ft snl 800 ft ewl of 320-ac lse and sect 13, Jos. Weihl sur, elev 1552 ft, Saddle Creek 1590-1613 ft, pump 114 bbls 36.4-gr, Bluff Creek sand 1627-37 ft, td 1638 ft.

Jones County—Failures: Con-Tex Pet. Corp.'s Guitar Est. 1, 330 ft out sec T&P Ry. 23, blk 14, elev 1664 ft, Bluff Creek 1660 ft, abnd 2031 ft.

Onyx Ref. Co.'s Bumpass 1, 330 ft of sec of 160-ac and A. B. Jones sur, elev 1766 ft, abnd 2950 ft.

McCulloch County—Failures: Mass-Tex O&G Co.'s Daniels 1, 660 ft out nwc John Classen sur, elev 1437 ft, abnd 165 ft.

Mass-Tex O&G Co.'s Joe Hays 1, 1320 ft snl 660 ft wel of S. H. Pool sur 14, elev 1427 ft, Ellenburger 1840 ft, abnd 1984 ft.

Mass-Tex O&G Co.'s Miller 1, 880 ft nsl 2640 ft wel of Harvey Cox sur 1186, Ellenburger 1835 ft, abnd 2375 ft.

Anzac Oil Corp. et al's G. R. White 2, 440 ft wel 240 ft nsl of J. W. Hagerlund sur 80, elev 1950 ft, abnd 1429 ft. .

Mills County—Failure: Dr. Emil Ott et al's Lula Gatlin 1, 3660 ft nsl 7480 ft ewl of sect 112, Caldwell CSL sur, Marble Falls 1937 ft, abnd 2027 ft.

SOUTH CENTRAL TEXAS WILDCAT

Dimmett County — Failure: W. J. Walton-Geo. W. Lyles' Julian K. Frost 1, (OWDD) 467 fr w&sl of 106-ac tr, John Sharp sur, 467 fr sel 4571 fr nel sur, 150 ne of Walton & Galt's Frost 1, previously abnd 7002 ft, cored almost solidly in lime, abnd 7285 ft.

SOUTHWEST TEXAS WILDCAT

Zapata County—Failure: Humble's Paula V de Garza 1, 660 nwl 1980 sw fr n cor sur 40 on 2083.9-ac lse, GS&F sur 281, abnd 6255 ft.

LOWER TEXAS COAST WILDCATS

Brooks County — Mariposa Oil Discovery: Humble's D. Sullivan Acct. 1, 3000 fr el 660 fr nl M. D. Floyd sur 152, 8 mi se Falfurrias, elev 101 ft, sand 8535 ft, dual comp, perf 7740-50 ft, test gas, shut in; perf 24 shots 8537½-45½ ft, flow 293.90 bbls 40.7-gr, ⅜-in, gor 998/1, tp 1500 lbs, td 8545½ ft.

Live Oak County — Kittie West Oil Discovery: Continental's Kittie West Schreiner 1, 330 fr nel 330 fr nwl 80-ac lse, D. R. Fant & J. Pointevent sur on lot 567, perf 36 shots 6705-24 ft, flow 46 bbls 55.2-gr oil, 7,500,000 gas, 15.6% bs&w, ¼-in, tp 2071 lbs, td 7610 ft.

San Patricio County — Failures: Hewit & Dougherty's Walter F. Timon 1, 467 fr n&el blk 120 San Patricio Town tr, 1200-ac lse, dr 6250 ft, pb and st, abnd 3628 ft.

H. H. Howell's Paul A. Allen 1, 467 fr nel

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UPPER TEXAS COAST WILDCATS

Austin County—Failure: Chas. Snellstrom's Ed Blazek 1, 600 fr nel 912 fr nwl 70.8-ac lse 660 sw at ra fr RR row, David Milburn and Thos. Davis sur A-71, elev 112 ft, jkd & abnd 2376 ft.

Austin County—Blue Lake Oil Discovery: Glenn McCarthy et al's Ida Dudley Wilson et al 1, 330 fr s&el 120-ac lse 330 n of nl of Wm. Roberts sur in John Bradley sur, 1320 nw of well 25-A, elev 29 ft, sand 8702 ft, perf 39 shots 8702-14 ft, pump 60.78 bbls 34.8-gr oil, 10% wtr, gor 100/1, td 10,808 ft.

Liberty County—Failure: Jack W. Frazier's Ada Ola Willis 1, 3500 s at ra fr c of nl th 500 w at ra to lcn in 3107.15-ac lse, Rbt. Burrell sur, 3 mi e of Devers, abnd 8005 ft.

Matagorda County—Failure: A. H. & C. L. Rowan's Louis LeTulle 1, 1420 at ra fr wl 3200 fr el 6482 fr sl 2476-ac lse, Richard Graves sur A-42, abnd 10,347 ft.

Orange County — Failure: Pan American Prod. Co.'s-Tide Water's Miller-Vider Ld. Co. 1, 330 fr nwl 2600 fr nel John Preveto sur on 187.62-ac tr, 3 mi w of Orange, abnd 8013 ft.

Trinity County—Failure: Navarro Oil Co.'s Edward Bolton et al 1, (OWDD) 660 n&e of swc blk 88 3 mi se of Saron twnste in Henry Bond sur & Lbr A-75, otd 6287 ft, perf 9770-88 ft, rec mud & Wtr cut with oil & 1850 ft sw, abnd base Woodbine 10,470 ft.

EAST TEXAS WILDCATS

Henderson County—Failure: Humble's Jones-Huddleston 1, 5720 ft snl 830 ft ewl of K. H. Douglas sur, elev 377 ft, Nacatoch 1334 ft, Pecan 2123-2241 ft, Austin 3039-3481 ft, Sub-Clarksville 3520 ft, Woodbine 3900 ft, Georgetown 4687 ft, Kiamichie 5650 ft, Goodland 5710 ft Paluxy 5863 ft, Glen Rose 6103 ft, Massive anhydrite 7143-7340 ft, Pettit 7863 ft, Travis Peak 7988 ft, abnd 8326 ft.

McLennan County — Failure: Albert Plummer et al's McKie 1, 1940 ft wel 1400 ft sel of 516-ac tr and Farnham Fryes sur 352, abnd in schist 2020 ft.

Van Zandt County—Failure: Lone Star Producing Co.'s Goode 1, 795 ft w of m/e/el 58 ft n of m/n/sl of 1686-ac tr and D. Rose sur, elev 491 ft, Woodbine 3220 ft, Georgetown 3840 ft, Fort Worth 4390 ft, Goodland 4770 ft, Paluxy 4822 ft, Kiamichi 4710 ft, Glen Rose 5060 ft, 1st anhy 5970, massive anhy 6174-6370 ft, Rodessa 6360 ft, lower anhy 6410 ft, Bacon 6370-82 ft, lower porosity 6510 ft, Pettit 7010 ft, Travis Peak 7114 ft, abnd 7714 ft.

NORTH TEXAS WILDCATS

Archer County—Failures: P. C. Burns et al's Fish 1, 150 ft ewl 1050 ft nsl of blk 78, J. W. Harris subdvn, abnd 1402 ft.

C. T. Hedges et al's Walsh 1, 300 ft nsl 250 ft ewl of TE&L Co. sect 2416, abnd 1405 ft.

Cooke County—Failures: H. W. Caudle et al's Holland 1, 1018 ft nsl 150 ft ewl of BBB&C Ry. sur A-166, abnd 1807 ft.

Nu-Enamel Oil Operating Co.'s Bush 1, 330 ft s&e of nec of R. Wheelock sur, but in M. G. Carico sur A-200, abnd 1607 ft.

Throckmorton County — Failure: J. L. McMahon et al's Record 1, 450 ft out swc TE&L Co. sect 1609, abnd 841 ft.

Wichita County — Failure: Rathke Oil Co.'s Vogel 1, 150 ft ewl 1100 ft snl of s½ H&GN Ry. 35, A-163, abnd 585 ft.

WYOMING WILDCAT

Natrona County—Oil Mt. Tensleep Discovery: Texas Co.'s Clark 1, c ne sw 35-33n-82w, elev 5770 ft, Tensleep 2622 ft, Amsden 2930 ft, Madison 2085 ft, Deadwood 3405 ft, perf 56 shots 2660-70 ft, swab 17 bbls 12.4-gr oil, installing pump, td 2416 ft, pb 2668 ft.

WILDCAT STARTS

ALABAMA

Fayette County: W. M. Dalton's Morris White 1, c nw se ne 21-16s-11w, dr 500 ft hard sh.

Sumter County: J. H. Gwin's Allison Lbr. Co. 1, c ne sw 36-19n-4w, 4000-ft test.

CALIFORNIA

Kern County: Bender Drilling Co.'s Vedder 14-3, 14-28s-28e, West Round Mountain area, lcn.

Ventura County: Continental's Casitas 2, 7-3n-23w, Red Mountain area, lcn.

ILLINOIS

Jasper County: Robinson & Puckett's Roberts 1, ne ne se 26-7n-10e, lcn.

Jefferson County: Ben O. Nation's Schuster 1, se se sw 8-2s-4e, lcn.

Marion County: Texas Co.'s Crowley 1, nw nw nw 15-4n-3e, dr.

Washington County: James N. Harsh's Konkel 1, sw nw ne 35-3s-2w, lcn.

Wayne County: Ashland O&R's Wilson 1, ne se ne 15-1s-8e, lcn.

White County: T. B. Dirickson's Grant 1, ne sw sw 36-6s-9e, dr.

INDIANA

Posey County: Fisher Oil's Webb 1, sw sw sw 2-7s-13w, lcn.

Vigo County: G. A. Earnhart's Leach 1, ne sw ne 36-11n-9w, lcn.

KANSAS

Barton County: Champlin O&R Co.'s Tuggle 1, ne sw nw 28-20s-14w, mirt.

Champlin O&R's Christianson 1, ne sw ne 29-20s-14w, woc.

Cowley County: Wolf Creek Oil Co.'s Bussart 1, ne nw sw 23-31s-3e, lcn.

Graham County: Iron Drlg. Co.'s Everest 1, se nw ne 32-8s-21w, dr.

Helmerich & C. S. O.'s Davis 1, sw c 5-9s-21w, lcn.

Harper County: Lion O&R's Muir 1, sec 10-31s-8w, lcn.

Kiowa County: Stanolind's Zentz 1, swc 29-20s-18w, lcn.

Rooks County: Harber Drlg. Co.'s Broebst 1, nwc 7-6s-10w, dr.

KENTUCKY

McLean County: Miller & Shiarella's Leachman 1, 18-N-27, lcn.

NORTH LOUISIANA

Bienville Parish: Placid Oil Co.'s Nebo Oil Co. B-2, c sw ne 24-15n-7w, 8000-ft test.

Caldwell Parish: Shell's Louisiana Central O&G 2, 2277 s 1507 e of nwc 26-15-2e, lcn.

De Soto Parish: H. C. Owens' L. C. Dickson 1, 2349 fr el 480 fr nl 23-14n-13w, 3000-ft test.

Madison Parish: Sinclair Prairie's Singer Mfg Co. 1, c se se 14-15n-12e, 6000-ft test.

Natchitoches Parish: Ben H. Morgan's B. T. Locke et al 1, se ne 3-10n-10w, Woodbine test.

SOUTH LOUISIANA

Beauregard Parish: Magnolia's Lutcher-Moore D-1, 660 s 660 w of nec ne¼ se¼ 34-5s-12w, 12,000-ft test.

Jefferson Parish: Texas Co.'s State-Little Lake 1, s 66° 53 mins e 10,276 fr USCG Station "Brusle" in Little Lake T-18s-23e, 13,000-ft test.

Lafourche Parish: Stickney, Hawkins-Signal O&G Co.'s LaGarde 1, 2211 s 474 e of nwc 26-15s-17e, 10,300-ft test.

MICHIGAN

Kent County: Mich. Devonian's Westrate 1, nw nw se 9-5n-12w, rig.

Lake County: J. P. O'Neill's Hurley 1, w½ nw nw 11-19n-13w, lcn.

MISSISSIPPI

Covington County: Cities Service's Reuben Aultman 1, c ne nw 22-7n-16w, Tuscaloosa test, bldg rds.

Jones County: Gulf's Davis Grayson 1, 330 ft n&e swc ne se 18-9n-13w, rds comp.

Lauderdale County: J. H. Gwin's Hunter-Phillips 1, c lot 1, 26-5n-18e, dk.

Madison County: Carter Oil Co.'s Virgil Jones 1, c nw ne 23-11n-3e, bldg rds.

Marion County: Texas Co.'s V. L. Ladner et al 1, 12-1n-17w, lcn.

Rankin County: Geo. W. Lowells' L. L. Billings 1, se ne 11-4n-1e, rur.

MONTANA

Toole County: Thorpe & Walker's O'Laughlin 1, sw sw nw 3-31n-1w, Dunkirk area, ru.

Sweetgrass County: Stanolind's L. J. Rapstad 1, se se sw 31-2n-15e, Big Timber area, lcn.

NEW MEXICO

Eddy County: Martin Yates, Jr., et al's State-Yates & McKee 2, se ne sw 24-19s-29e, machine for 2500-ft test.

OKLAHOMA

Creek County: L. B. Jackson et al's Fee 1, nw se sw 28-17n-9e, lcn.

Kingfisher County: Gulf's Triplett 1, ne sw 8-15n-5w, lcn.

Lincoln County: F. A. Gillespie & Sons' Freeman 1, nw ne 17-16n-5e, lcn.

J. J. Fleet et al's School 1, se se sw 16-16n-6e, woc.

Logan County: Vierson & Mid-Continent's Acton 1, se se sw 21-19n-4w, lcn.

Oklahoma County: British-American's Reece 1, ne ne ne 18-14n-1w, lcn.

Pottawatomie County: L. B. Jackson et al's Rose 1, nw se ne, lcn.

Cities Service's Ball 1, nw sw nw 35-6n-3e, lcn.

Seminole County: Sam Jewell's Huddleston 1, ne ne se 31-6n-6e, lcn.

WEST TEXAS

Andrews County: Magnolia-Humble's E. P. Cowden 1, c nw se PSL 7, blk A-55, mim for Ellenburger test.

Mid-Continent's University 1-15, c ne nw sec 42, blk 13, 2¼ mi s by w of Fullerton-Devonian fld, lcn 8750-ft Devonian test.

Gaines County: Honolulu Oil Corp.'s D. E. Cunningham 1, c nw se W.T. Ry. 89, blk G, 1½ mi s by w of Yates wc gasser, lcn 5700-ft San Andres test.

Humble's O. L. Bishop 1, c ne sw D&W Ry. 45, blk H, 5¼ mi w by s Cedar Lake fld, lcn 5500-ft San Andres test.

Lamb County: Shamrock O&G Corp. (was Woodley Pet. Co.'s) Bird 1, (OWDD) c nw se sect 66, blk T, T. A. Thomson sur, elev 3555 ft, Clear Fork 5170 ft, Tubb sd 5765 ft, otd 7265 ft, mim to deepen to Ellenburger.

Pecos County: Oscar Donnelly et al's Wilson 1, se sw sw T.&St.L. Ry. 5, blk 145, lcn 1700-ft cable tool test.

Dave Elder et al's J. H. Tippett 1, sw nw ne GC&SF Ry. 64, blk 194, lcn 1800-ft cable test.

Scurry County: Lion's E. C. McLaughlin 1, 1998 ft nsl 1831 ft wel H&TC Ry. 197, blk 97, lcn 4000-ft test.

WEST CENTRAL TEXAS

Brown County: B. C. Mann et al's L. O. Goss 1, 450 ft nsl 1320 ft wel BBB&C Ry. sec 10, lcn 600-ft cable test.

Stephens County: Sinclair Prairie's L. J. Ackers 1, 330 ft out swc of J. M. Evans sur A-2157, lcn 4600-ft Ellenburger test.

Sinclair Prairie's Carrie E. Tipton 1, 330 ft out nec TE&L Co. sect 2960, lcn 4600-ft Ellenburger test.

Taylor County: Republic Nat. Gas Co.'s J. T. Hensiee 1, 330 ft nsl 2310 ft wel of J. A. Nabors sur 10, lcn 2700-ft cable test.

SOUTH CENTRAL TEXAS

Bastrop County: C. F. Carter et al's P. E. Turner 1, 450 fr el 900 fr nl 300 fr sl 80-ac lse, Jas. Standifer sur, 4 mi sw Elgin, 900-ft core test.

Val Verde County: O. H. Hammer's L. E. Davis 1, 637.5 fr nl 50 fr el GC&SF sur 4, sect 2886, 5087-ac lse, 60 mi n of Del Rio, started by W. A. Miller in March, 1941, dr 2900 ft.

Webb F. Schoolfield's Killam-Bruni 2, 990 fr nl 1040 fr wl 1600 fr el blk 2 Brown subdvn Albercas Gr 320-ac lse, 720 s se of Well 1, lcn 2750-ft test.

SOUTHWEST TEXAS

McMullen County: Quintana Pet. Corp.'s South Texas Syndicate 2-F, 1000 fr wl 1750 fr sl Jas. Fitzpatrick sect 14 96,000-ac lse, lcn 7000-ft test.

Zapata County: Geo. H. Echols' T. Dominguez 1, 660 sw of nwl 401-ac lse porc 31 sh "A," lcn 3500-ft test.

Geo. H. Echols' Volpe Est. 2, 3350 fr nwl 4375 fr nel 3000-ac lse Porc 31 sh 1, lcn 3500-ft test.

LOWER TEXAS COAST

Jim Wells County: Bridwell Oil Co.'s N. A. Hoffman 2-H, 330 fr e&sl 400-ac lse, La Trinidad Gr, 3½ mi sw of Ben Bolt, 3129 s se of gas well 1, 949 ne of Bridwell's R. Garcia 1, lcn 5000-ft test.

Karnes County: Magnolia's D. O. Klingeman 1, 330 fr nly nw&swl 672-ac lse, Jas. Bradbury sur, 9 mi sw Karnes City, lcn 8000-ft test.

Kenedy County: Humble's C. M. Armstrong 3, start m/wly sec La Barreta Gr, go nely with Gr line 12,800 th nw at ra 6000, 11,600 fr wl 12,800 fr m/sly/sl 49,396-ac lse, lcn 11,000-ft test.

Kleberg County: Sam E. Wilson, Jr.'s Joe Dvorak, Jr. 1, 467 fr n&el 60-ac lse, King addn 3 sect 8, sw¼ sect 8, lcn 10,000-ft test.

Nueces County: Homer Easterwood et al's Mantor & Briggs 1, 330 fr el 990 fr sl blk 16 Mantor-Briggs & Kuyendall subdvn of Casa Blanca & Dejaen Grs, 700.26-ac lse, lcn 6500-ft test.

San Patricio County: Lonnie Glassock's Mrs. Louise Newman 1, 330 fr sl 3780 fr wl 4490 fr el 400-ac lse, J. W. Bullard subdvn blk 9, 3 mi n of Odem, lcn 7500-ft test.

UPPER TEXAS COAST

Brazoria County: Jack W. Frazier's J. C. Thompson et al 1, 330 fr n&el n 80-ac of Thompson et al 160-ac tr, HT&B sur A-302 sect 77, 6000-ft test.

Orange County: Gulf's Caswell Trust 1-A, 1800 w 947.6 s of nec 500-ac lse BBB&C sur A-50, 10,150 swly fr Port Neches, elev 12 ft, lcn.

Wharton County: Sam G. Harrison's G. P. Willis, R. B. Wallace, R. H. Hancock 1, 466 fr s&wl se sw sect 14, L. L. Miller sur, 1700 ne of Harrison's El Mauritz in nwc sect 11, elev 75 ft, 6500-ft test.

EAST TEXAS

Kaufman County: Ryan Consol. Pet. Corp's Mrs. W. Dorsey Brown 1, 660 ft out of nwc of 786-ac tr, Matilda Reynolds sur, mim.

NORTH TEXAS

Archer County: D. H. Bolin et al's J. W. Young 2-A, 1750 ft wel 1550 ft nsl TE&L Co. sect 2487, lcn 1500-ft rotary test.

Farmer & Hansen's B. D. Ikard 1, 150 ft nsl 1833 ft ewl TE&L Co. sect 1890, lcn 1200-ft rotary test.

Clay County: Fain-McGaha-Dr. & Explor. Co.'s J. Weist 1, 660 ft out nwc lot 78, sect 14, Montague CSL sur, A-307, lcn 5000-ft Ellenburger test.

Cooke County: H. D. Egger et al's Milton

The OIL WEEKLY'S TRADING POST

USED EQUIPMENT FORUM

CLASSIFIED ADS . . . EQUIPMENT . . . SERVICES . . . PERSONNEL

FOR SALE

FOR SALE

1 National Drilling Machine consisting of all sills, new mast, new fibre friction pulley, belt, reverse clutch, beam, new temper screw, new wire line clamps.
1 No. 45 Star Spudder now running with TXA Hercules Motor.
1 TXO Hercules Motor re-built and re-conditioned.
1 International 100 HP Motor re-conditioned, good as new.
Short drilling bits and some odds and ends in cable tools.
All of above worth the price. Address P. O. Box 247, Owensboro, Ky.

■ For Sale: One (1) steel beam type drilling-in unit with 110 HP Buda engine, A type mast, drilling and sand lines and Miscellaneous tools —Veeder Supply & Development Co., Cherryvale, Kansas.

■ WELL DRILLING machines, cable tools, bits, stems, jars, cable, bailers, blocks, elevators, engines, boilers, fishing tools. Write S. W. Pressey, Pueblo, Colo.

■ FOR SALE: Power Rig and Derrick, complete less drill pipe, powered with two GAK Waukeshas. Oil bath draw works, Wilson Snyder Pump, suitable for workover or drilling. Call or write R. O. Harris, Eunice, Louisiana.

■ FOR SALE: New 384′ 6″ 23.50 lb. 8 thd. Emsco Screen Pipe; New 209′ 5-3/16″ 17 lb. 11½ thd. Inserted Emsco Screen Pipe; New 169′ 4¼″ 13.75 lb. 10 thd. Emsco Screen Pipe. E. E. Eversole, Box 386, Healdton, Oklahoma.

■ FOR SALE: Oil and gas leases on structure and in shallow territory. Will furnish one or more leases for drilling contracts. W. P. Harley, Bowling Green, Kentucky.

■ 1—13½ x 20—Bessemer Compressor Cylinder, $400.00; 4—12 x 12—Ingersoll-Rand Compressor Cylinders, $200.00 each. Lesh & McCall, Nocona, Texas.

■ FOR SALE: One 24-W Bucyrus-Erie Rig on a No. 1 White Truck. Tools for 10″, 8″, and 6″ hole. Truck and Rig in first class condition with extra good tires. Ready to run. Rig ready for delivery in 20 days. L. L. Morris Supply, Glasgow, Kentucky.

FOR SALE BY OWNER AT SILICIA, KANSAS WAREHOUSE

125,000 ft. Used 3″ Upset Tubing
20,000 ft. Used 2½″ Upset Tubing
3,000 ft. Used 4″ Lapweld Line Pipe
3,300 ft. Used 3″ Upset Cement Lined Tubing
50,000 ft. Used Jones Type 7 Sucker Rods ⅞ & ¾
3,000 ft. New 3½″ 150 lb. test Johns-Manville pipe with fittings
500 ft. New 4″ 150 lb. test Johns-Manville pipe with fittings
2,000 ft. New 6″ 150 lb. test Johns-Manville pipe with fittings
3,600 ft. New 7″ 24 lb. 8 Rd. Thd. Seamless Steel Casing Grade H-40 Range 2
3,200 ft. New 7″ 24 lb. 10 V Thd. Seamless Steel Casing Grade H-40 Range 2
4,000 ft. Used 7″ 24 lb. 10 V Thd. Seamless Steel Casing Grade C Range 2
5 Lee C. Moore Standard Rig fronts with 11′ band wheels complete with 5 O.C.S. counter-shaft clutches, Happy Idlers for long & short belts and 40 H.P. Weber gas engines, galvanized iron engine houses & belt halls that have been Tnemecized.
5 94′ Ideco 330,000 lb. galvanized derricks, Tnemecized complete with galvanized bolts, two sheave crown blocks and guy wires. Standing.
1 94′ Ideco 330,000 lb. galvanized derrick complete with two sheave crown blocks. Not erected.

Subject to prior sale, withdrawal from market
J. H. Tatlock, Wichita 2, Kansas
L.D. 18 or Local 4-6336

SERVICES

WM. M. WELLS
Geophysicist

Seismograph Reviews
And Interpretation
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209 First National Bank Bldg.
Shreveport, Louisiana

HELP WANTED

—WANTED—

MECHANICAL AND ELETRICAL ENGINEER

Oilfield Equipment Manufacturer of International prominence located in Beaumont, Texas, desires to employ qualified Mechanical or Electrical Engineer to assist in the design of D.C. Electric Drilling Rigs. Good salary, with unlimited post-war possibilities. All answers strictly confidential. Address: Box 6, c/o The Oil Weekly, Houston, Texas.

■ Wanted by a consulting geophysical organization, Petroleum Engineers with Hayward Mudlogging experience or its equivalent. Immediate openings in Venezuela. Excellent opportunity for advancement to managerial positions throughout the world. Address: Box 36, c/o The Oil Weekly, Houston, Texas.

■ Wanted Man—Knowledge of Map Drafting and Geology. Good free hand letter. Map room work. Chicago location. Give complete details in first letter. Address: Box 19, c/o The Oil Weekly, Houston, Texas.

WANTED

Mechanical Engineer

Must be capable of assuming responsibility of designing and estimating. Permanent position available with progressive oil tool company in Houston. Our employees have been informed of this advertisement. Address: Box 20, c/o The Oil Weekly, Houston, Texas.

MAJOR OIL COMPANY WANTS GEOPHYSICAL PARTY FIELD AGENT—GOOD POSITION FOR RIGHT MAN

Experience in South Louisiana marsh and water areas important. Some technical knowledge and experience with boats desirable. Apply by letter giving experience and references. Interview to be arranged. Address: Box 17, c/o The Oil Weekly, Houston, Texas.

LEASES, DRILLING ACREAGE, ETC.

■ So. Georgia shallow sand leases for sale. Blocks 1—5—10—15—20—25 thousand acres. Owners: Box 364, Waycross, Georgia.

■ Florida-Georgia, low-priced royalty, fully participating perpetual minerals under major leases, also, low-priced leases, small or large blocks, in areas extensively leased by majors. Address Box 2191, Orlando, Florida.

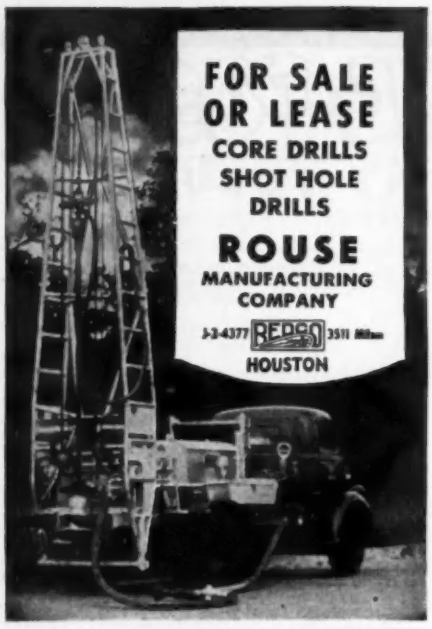
■ Driller, Would you complete a well first year for sizable lease 15/16 free, geology uncertain? John H. Smith, 406 First Natl. Bank Bldg., Longview, Texas, Phone 608.

ADVERTISING RATES

TRADING POST SECTION

Regular classified advertisements for this special section, set in type this size without border, take flat-rate of 7 cents per word for the first insertion and 5 cents per word for each subsequent insertion of same copy. Display advertisements for this section, set in suitably larger type with ruled border, are $5.00 per inch for the first insertion and $4.00 per inch for subsequent insertions. Remittance must accompany copy which should be sent to:

Trading Post Section, The Oil Weekly
P. O. Box 2608 Houston 1, Texas



PAGES 3079 THRU 3098 IN
THE COMPOSITE CATALOG

SQUEAKS *from the* BULL WHEEL

Let's Be Honest

Filling out an application for dependent's aid, a soldier answered "No" to the question as to whether he had any dependents.

"You're married, aren't you?" an officer asked.

"Yes sir, but she ain't dependable."

Wrong Guess

"What did the Doctor say when he was late on the maternity call?"

"I'll listen, but keep it clean."

"He said: 'Hello, baby'."

She's Always Ahead

"Darling, there's a certain question I've wanted to ask you for weeks."

"Well, get a move on, Joe. I've had the answer ready for months."

The Warmup

"I got a 16-page letter from Lucy."

"What did she say?"

"She said she will tell me the news when she sees me."

Definitions

Wisdom: Knowing what to do next.
Skill: Knowing how to do it.
Virtue: Not doing it.

Life Is So Simple

"I have something here that will make you popular, make your life happier, and bring you a host of new friends."

"Fine: I'll take a quart."

Line Was Busy

"I never knew Frank had twins."

"Yeah; he married a telephone operator and she gave him the wrong number."

This Curious World

A speedometeer does not give a true picture of how far a couple in a car have gone.

Nowadays, you never know if a bride's blush is embarrassment or a flush of victory.

He wrote his girl every day he was in the Army, so he shouldn't have been surprised when he came home and found her married to the mail man.

Most girls don't worry about a man's English if his Scotch is good.

All a working girl wants from a man is his seat on the bus, his salary every payday, and his job.

A wedding ring is like a tourniquet—it stops circulation.

Any woman can keep a secret—but she needs at least one other woman to help her.

It's hard to date women war workers. They aren't satisfied with a good time—they want time and a half.

Overheard: "I'd marry him if he were rich or taller or better looking—or if he'd ask me."

Nothing helps a girl's popularity like being easy on the aye.

And then there was the mountaineer who put a silencer on his shotgun because his daughter wanted a quiet wedding.

—The Southwestern Purchaser

"Keep your shirt on! I'll get to you in a minute."

Poet's Nook

Rub a dub dub
Three men in a tub . . .
Hotels are really crowded these days.

Encore

Just give me a man
  With a million or two,
Or one that is handsome
  Would happily do;
A dashing young fellow
  Is swell any day,
Or one that is famous
  Would suit me O. K.
But if the man shortage
  Should get any worse,
Go back to the very
  First line of this verse.

School Can Be Fun

"Would you care to learn love-making by mail?"

"That all depends on the male."

Long Shorties

Inspecting officer: "Do your underclothes fit you satisfactorily?"

Recruit: "The undershirt is okay but the shorts are a little snug under the armpits."

Heritage

Father: "Dou you suppose our son gets his intelligence from me."

Mother: "He must; I've still got mine."

Stay After Class

Professor: "What happens when a body is immersed in water?"

Coed: "The phone rings."

Sure Sign

"The war will be over any day now."

"Why do you think so?"

"The boss bawled me out this morning."

Easy One

He: "If I had a million dollars do you know where I'd be?"

She: "Sure—with me on our honeymoon."

GUY MABEE, owner of the Guy Mabee Drilling Company, Midland, was elected chairman of the West Texas-New Mexico chapter of the American Association of Oil Well Drilling Contractors at an Odessa meeting attended by about 40 contractors. Fred Postelle, head of the Postelle Drilling Company, Odessa, was chosen co-chairman. Howard P. Holmes and Brad Mills, both of Dallas, president and executive secretary, respectively, of the national organization, spoke on activities of the body.

FRANK B. TAYLOR has joined the staff of Independent Petroleum Association of America as Editor of The Independent Monthly. He will be at the national headquarters of the Association in the Thompson Building, Tulsa. Taylor went to Tulsa in 1936 from Texas, where he was engaged in natural gas measurement and production for Panhandle Eastern Pipe Line Company, and assumed the duties of Mid-Continent Editor of THE OIL WEEKLY, a post which he held until recently when he entered Engineering Sales and Commerce Company of Tulsa as a partner.

HARVEY WHITAKER, consulting geologist of San Antonio, was elected president of the South Texas Geological Society. Other officers are George H. Coates, independent oil operator, vice president; Marion J. Moore, Transwestern Oil Company, secretary-treasurer; and Harold D. Herndon, Saltmount Oil Company, member executive committee.

WILFRED M. HENRY, assistant treasurer and assistant secretary-controller of the Empire State Oil Company, Thermopolis, Wyoming; and Percy A. Brawley and William E. Davis, assistant comptrollers of the Standard Oil Company of New Jersey, New York City, have been elected to membership in the Controllers Institute of America.

SHERRILL WILLIAMS of Cities Service Oil Company's scouting department, has been transferred from the Olney, Illinois, district to Straight Camp in the Hugoton gas field, Texas County, Oklahoma Panhandle.

A. W. CHANDLER, former chief mechanical engineer for Engineering Laboratories, Incorporated, Tulsa, has joined the staff of the Refinery Supply Company and will specialize in gas engineering products.

DR. M. KING HUBBERT, research geophysicist, Shell Oil Company, Houston, spoke before the Tulsa Geological Society at Tulsa University on "The Strength of the Earth."

H. L. MOIR, products engineer for The Pure Oil Company, Chicago, spoke on the manufacture and utilization of cutting oils before the Mid-Continent Section, Society of Automotive Engineers.

W. C. MacMILLAN, vice president of Continental Oil Company, was elected president of Navarro Oil Company succeeding B. A. Brill, resigned. Guy Graham, Navarro executive vice president, secretary and treasurer, and A. M. Cannan, head of the land department also resigned and with Brill will enter business as independent oil operators. New members of the Navarro board are H. D. Henderson and MacMillan.

W. C. MacMillan

JEAN BRAWNER of Bristow, Oklahoma, for six years employed as a secretary in the office of Oklahoma's attorney general, recently joined the headquarters staff of the Interstate Oil Compact Commission in Oklahoma City. Miss Brawner, in addition to secretarial work, will serve as assistant in the Compact's public relations department.

HARRY A. HESS, formerly in the natural gasoline department of Sinclair Prairie Oil Company in the East Texas field, is now with Bethlehem Supply Company, being located in Chase, Kansas.

DONATO ESTROP, drilling superintendent for Petroleos Mexicana, Poza Rica, Mexico, is recovering from an operation in a Houston hospital.

GORDON B. SCHAEFER, chief accountant and office manager of the Southeastern Pipe Line Company, Atlanta, and Louis C. Stevens, assistant comptroller of the Standard Oil Company (New Jersey), New York City, have been elected to membership in the Controllers Institute of America.

CHARLES ABBOTT, former district landman in charge of the Jackson, Miss., office of the British-American Oil Producing Company, has been succeeded by J. J. Statler, who took over the duties last week. Statler was formerly connected with the Continental Oil Company in Jackson. Abbott has gone to Wichita Falls, Texas.

DR. F. B. PLUMMER, Bureau of Economic Geology, University of Texas, spoke on "Future Oil Supplies After the Depletion of Present Reserves" before the Houston Geological Society.

J. L. P. CAMPBELL, Lane-Wells Company, spoke on "Some Practical Aspects of Radioactivity Well Logging" before the Gulf Coast Section of the AIME in Houston. The talk was based on a paper prepared by Campbell and Warren Jackson, also of Lane-Wells.

H. W. HAIGHT of New York, manager of Standard Oil Company of Egypt, is in Houston for a stay of several days.

WALTER C. WHITE has been promoted to superintendent of the Michigan-Toledo Division of The Sohio Pipeline Company. He will also represent The Sohio Petroleum Company in purchasing and gathering in Michigan. His headquarters will be at Mount Pleasant, Michigan.

CHARLES A. MIX, regional geologist for the Standard Oil Company of Texas in the West Texas district and a resident of Midland for 14 years, has been transferred to Tyler, where he has charge of a new regional office. J. S. Gibbs, formerly of Houston, succeeds Mix at Midland.

HAL A. THOMPSON has been named general manager of the newly formed Rocky Mountain District of The British American Oil Producing Company with offices in Casper, Wyoming. The new district consists of Montana, Wyoming, Colorado and Utah. This is part of the company's plan to decentralize the management of the organization. Thompson formerly headed the land department for British American in this territory.

Other changes in personnel consist of the naming of J. A. Shoemake to the land department, T. N. Roberts, geological department, and Joe Rumsey, oil scout.

Deaths

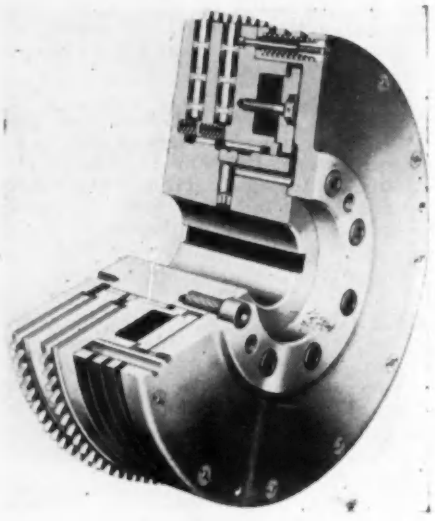
WARD A. MILLER, president and general manager of The Illinois Pipe Line Company until his retirement in 1929, died March 29 at Lakewood, Ohio.

Miller, 76, was born in Pennsylvania and became general superintendent of the trunk lines of The Ohio Oil Company in 1908. When the Illinois Company was organized in 1915, he was made vice president and general manager, and in 1917 he became president and general manager.

JOHN CANNON VANN, office manager for J. R. Turnbull Company and secretary-treasurer of Christian-Carpenter Drilling Company, died in Houston, March 30. Vann, 49, served in World War I as a first lieutenant.

G. FRED JONES, retired independent oil operator, died in Tulsa March 28. Jones, 58, had lived in Tulsa since 1923, going there from Alexandria, Indiana.

MABRY ALEXANDER FIGURES, 41, who had been with Stanolind Oil and Gas Company for more than 20 years, died in Tulsa March 29.



1—Air-Actuated Clutch

Twin Disc Clutch Company, Racine, Wisconsin, has developed an air-actuated clutch recommended for remote control setups and where "feather-touch" engagements in heavy-duty operations are necessary.

Known as Twin Disc Model P Air-Actuated clutch, this new piece of equipment is featured by a hub and back plate, center plate, floating plate and friction discs of essentially the same proportions as the Model E, and is manufactured in a wide range of sizes, from 14 to 36 inches, with capacities of from 65 to 895 horsepower.

The clutch operates by remote control with greatly reduced shaft space. Any amount of air, within limits, can be applied to the friction plates to provide either slow or fast engagement. Two methods for handling the actuating air supply are possible, depending upon where the clutch is mounted: first, by drilling the shaft and using an end shaft rotary air seal; second, by using a special shaft-a-round, or mid-shaft rotary air seal.

2—Generating Sets

Construction Machinery Company, Waterloo, Iowa, has developed a line of electric generating sets available in 65 basic models of AC and DC sets, ranging in capacities from 350 to 25,000 watts.

Series W2C can be mounted on trailers and has a built-in receptacle for demountable fuel tank and battery housing.

These plants are recommended to supply dependable electric power comparable to that provided by city power companies, wherever electricity is not available.

American Iron, Machine Sells Five Repair Plants

American Iron and Machine Works Company, Oklahoma City, Oklahoma, announces sale of 5 oil field repair plants.

The Great Bend, Kansas, shop has been sold to C & W Machine Works; the Monahans, Texas, shop to the Miller-Nelson Machine Works; the Houston shop to L & H Machine Works; the New Iberia, Louisiana, shop to The Red Fox Machine and Supply Company; and the Harvey, Louisiana, shop to Young-Elkins Machine and Supply Company.

Sale of these shops was made so the company can concentrate on expansion of manufacturing facilities at the Oklahoma City plant.

The firm will continue to maintain offices and warehouse at 2205 Quitman Street in Houston, for servicing of Texas Gulf Coast, Louisiana, and Mississippi. It will also continue the policy of selling only through supply companies and will have service men in all active areas.

Only a few personnel changes have resulted from this sale. Joe T. Castles has been transferred from New Orleans to Shreveport to service the Shreveport area and Mississippi. Austin Brashears will service South Louisiana from headquarters at New Iberia.

3—Explosives Projectile

Well Explosives, Incorporated, P. O. Box 938, Fort Worth 9, Texas, has recently been organized by W. H. Thompson, of Fort Worth, to offer a method of treating stripper wells for the purpose of increasing the ratio of recoverable oil. The method may also be used successfully in new wells where a tight sand condition prevails. The company will operate under a basic patent granted to James Lewis Foster, of Wichita Falls, Texas, a petroleum engineer in the armed forces.

The patent grants broad protective right covering the delayed explosion of a gun perforation projectile. This approach to increasing the amount of recoverable oil is especially interesting in view of the recently developed explosives having many times the potency of TNT. In this way a relatively small projectile can travel a predetermined distance back into the producing section and then detonate with great power.

Foxboro Office Opened

The Foxboro Company, Foxboro Massachusetts, manufacturers of refinery and industrial plant control instruments, has opened a Tulsa office at 621 McBirney Building. W. A. Melton, president of the Engineers Club of Tulsa, has been appointed branch manager.

Suggestion Plan Adopted

Cooper-Bessemer Corporation, Mount Vernon, Ohio, has adopted a suggestion plan which is said to have brought hundreds of recommendations from employes which have increased efficiency and reduced the manufacturing cost of diesel engines and compressors the company manufactures.

Link-Belt Names Agent

Link-Belt Company, Chicago, Illinois, announces that the firm of N. Ellinger, Calle Coca 468, Casilla 677, Lima, Peru, has been appointed agent for the company's products in Peru.

Use This Coupon for Additional Information

FOR YOUR CONVENIENCE: Check or circle the numbers identifying the information you want; mail this coupon to The Oil Weekly and your request will be promptly sent to the manufacturer. To avoid delay be sure to indicate your complete mailing address.

THE OIL WEEKLY
P. O. Box 2608, Houston 1, Texas, U.S.A.

Please have the manufacturers send me, without obligation, more information or literature on items checked below. (Numbers correspond to descriptive paragraphs as shown in April 9 issue of The Oil Weekly):

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

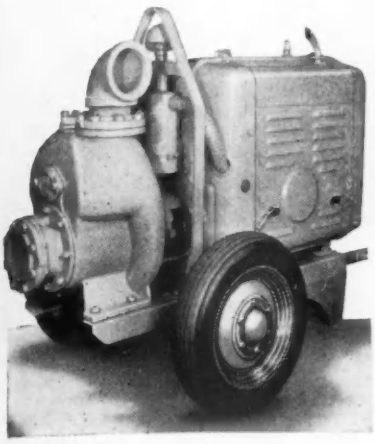
Company_____

Name_____ Title_____

Address or P. O. Box_____

City_____ State_____

(Print or type clearly name, company and address)



4—Centrifugal Pumps

Construction Machinery Company, Waterloo, Iowa, announces a new 6-inch centrifugal pump rated at 90,000 gallons per hour with additional reserve.

Features of the pump include a mixed flow impeller and properly proportioned and shaped volute, triple- self-adjusting shaft seal, a dual prime method of priming large ground shafts, built-in suction check valve, over-size ball bearings, improved flexible coupling drive and heavy duty engine.

The pump is available with 1800 to 1200 revolutions per minute electric motors or diesel engine.

Literature

5—Centralizers

Weatherford Spring Company, 202 W. Bridge Street, Weatherford, Texas, has published a new catalog describing its line of oil field specialties which include spiral casing centralizers, straight casing centralizers, wall cleaning scratchers, cement retaining baskets, and industrial springs.

6—Tractors at War

Bucyrus-Erie Company, South Milwaukee, Wisconsin, has published a booklet, "In War and Peace," which contains dramatic photographs of dozers, scrapers, dozershovels and other tractor equipment in action on both the war and home fronts. The booklet gives a vivid picture of dirt-moving machinery as an essential weapon of war. It points out that the war jobs performed by tractor equipment are basically the same as peacetime jobs and that, consequently, the same versatility and service can be expected by civilian users in the future.

7—Centrifugal Pumps

Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin, has released bulletin B6351, on Ss-B pedestal type centrifugal pumps. Developed for use where close-coupled motors were not practical, these pumps are driven by electric motors, steam turbines, gasoline or diesel engines, direct-connected and through v-belts and flat belts.

The booklet includes cross-section drawings of the various pedestal types and standard specifications, which are based on the standard construction "cast iron bronze fitted" pumps. Dimensions are illustrated and tabulated.

8—Clips

American Hoist & Derrick Company, Saint Paul 1, Minnesota, has revised its Crosby Clip instruction booklet in number CCB-11B. The revised booklet contains a table of the number of clips to use for all sizes of rope up to three inches. Also, instructions illustrated with diagram and pictures are given for properly making a wire rope fastening.

9—Threading Machines

The Oster Manufacturing Company, Cleveland, has published catalog No. 44 which contains material on pipe and bolt threading machines made by the company. All machines are illustrated and described.

10—Switches, Lights

General Electric Company, Schenectady 5, New York, announces two bulletins: GEA-4254 describes push-button units, selector switches and indicating lights for built-in machine tool applications.

GES-3303 announces a complete set of training material on industrial electronics.

11—Coating Service

The Evercrete Corporation, 424 West 42nd Street, New York City, New York, announces a free technical service on problems of protective coatings on masonry surfaces. The service will offer advice and suggestions on protection, maintenance and waterproofing of masonry surfaces.

12—Displacement Blowers

Pottstown Blower Company, Division of Allen Billmyre Company, Mamaroneck, New York, has issued bulletin No. P100 describing Pottstown rotary positive displacement blowers. The unit is designed for services where volume of air or gas discharged must remain constant under variations of pressure. The bulletin is illustrated with sectional drawings and views of parts showing design and construction of the unit.

13—Pumping, Gear

Oil Well Supply Company, Dallas, Texas, has published leaflets on the TC-23 HB and TC-33 HB Twin-Crank Pumping Units and the D-33 Double Reduction Gear. Both pieces of equipment are designed for heavy-duty oil field service.

14—Ball Bearings

Marlin-Rockwell Corporation of Jamestown, New York, has available a series of illustrated technical bulletins on the use, installation and maintenance of ball bearings.

Lufkin Foundry, Machine Company Names Officers

Walter W. Trout was named vice president and general manager at the annual stockholders' meeting of Lufkin Foundry & Machine Company, Lufkin, Texas.

Walter W. Trout

L. A. Little was elected vice president in charge of sales, and E. H. Bounds, treasurer, was elected a vice president, as was E. P. Trout.

A. E. Cudlipp, vice president in charge of purchases and the industrial supply division, and Jacque Wiener, of Shreveport, were added to the board of directors. Other directors are W. C. Trout, president; J. H. Kurth, Jr., vice president; E. L. Kurth, W. W. Trout, L. A. Little and S. W. Henderson, Jr.

L. A. Little has long been identified with the Lufkin company, having been in charge of the company's Dallas office.

E. P. Trout has been in charge of California sales for ten years. Trout will continue to direct California sales and, in addition, will supervise foundry operations at the Lufkin plant.

Walter W. Trout has been in charge of the company's Tulsa and Dallas offices and in recent years, has relieved his father as general manager.

W. C. Trout will devote a great deal of his time to the future of research.

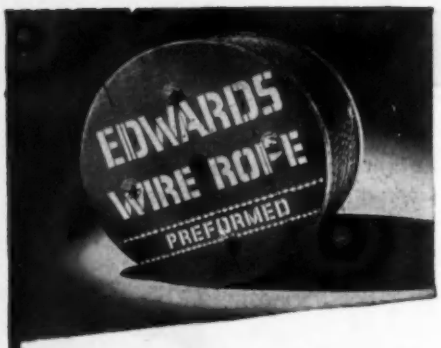
A. E. Cudlipp has been active in the company for 26 years, serving in various capacities having to do with purchasing, publicity and sales promotion and in charge of the company's industrial supply division.

R. HENQUET has returned to Schlumberger Well Surveying Corporation, Houston, from military service, and has been elected vice president and general manager, with headquarters at Houston.

He filled various executive positions with the company until the organization of International Cementers, Inc., of which he was executive vice president and general manager before he entered the Army.

VAL LINK, sales engineer for Westcott and Greis, division of American Meter Company, has been transferred from the Shreveport office to Dallas. Link began his career with the United Gas System. When he left that organization in 1937 he was in charge of the measurement department of the Laredo-Bruni District.

J. J. ROESSLE has joined the Hyatt Bearings Division of General Motors, as a sales engineer at the Pittsburgh, Pennsylvania, divisional sales office. He was formerly affiliated with Mesta Machine Company.



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So. San Francisco, Calif.

E. H. EDWARDS COMPANY

C. M. POWELL has been appointed Mid-Continent sales manager of International Derrick & Equipment Company and will have headquarters in Dallas. He was former manager of oil field equipment sales for the Mid-Continent territory.

C. M. Powell

A native Texan, Powell has been interested in oil field equipment since World War I, and closely associated with the development of many of the early boom fields in Texas. Previously with Bridgeport Machine Company and Black, Sivalls, and Bryson, Inc., Powell joined IDECO in 1925 as district sales manager of Oklahoma, later assuming charge of sales in the Oklahoma, Kansas, Illinois, and Indiana division, and then being transferred to Dallas.

GEORGE STEVEN has been named executive engineer at Buffalo for Worthington Pump and Machinery Corporation, Harrison, New Jersey. Harold W. Whiting, formerly Steven's assistant, succeeds him as chief engineer of the Buffalo works compressor division.

CLEM STEIN, manager of industrial sales of the International Derrick & Equipment Company, Columbus, Ohio, has been elected president of the American Hot Dip Galvanizers Association.

ALFRED L. GOEKE has been appointed service manager of the Tulsa branch of Westinghouse Electric Supply Company. He joined Westinghouse in 1933, starting in the Midwest District office in St. Louis, and later he was transferred to the Oklahoma City office.

JOHN A. TIDBALL has been engaged by Braden Steel Corporation of Tulsa as manager of the company's North Texas Division. Tidball formerly was connected with the International Derrick & Equipment Company as sales engineer in various districts and in Latin American development work. His headquarters will be in the Burt Building, Dallas.

MARCEL C. BOSS has been appointed chief engineer in charge of design and production operations for the Optimus Equipment Company, Matawan, New Jersey.

W. E. GRAVES has been named sales manager for The Steel Improvement & Forge Company, Cleveland, Ohio. R. A. B. Williams has been named sales representative for the Pacific Coast area.

WARREN W. MOODY of Dallas has been named Texas area representative for Duff-Norton Manufacturing Company, Pittsburgh.

F. S. COCKBURN has been reappointed field representative for Allis-Chalmers Manufacturing Company in Peru. Cockburn was an Allis-Chalmers representative in Peru for a number of years prior to the outbreak of the war.

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